OCTOBER 15, 1936 FIRST AERO WEEKLY IN THE WORLD

OCT 27 1936

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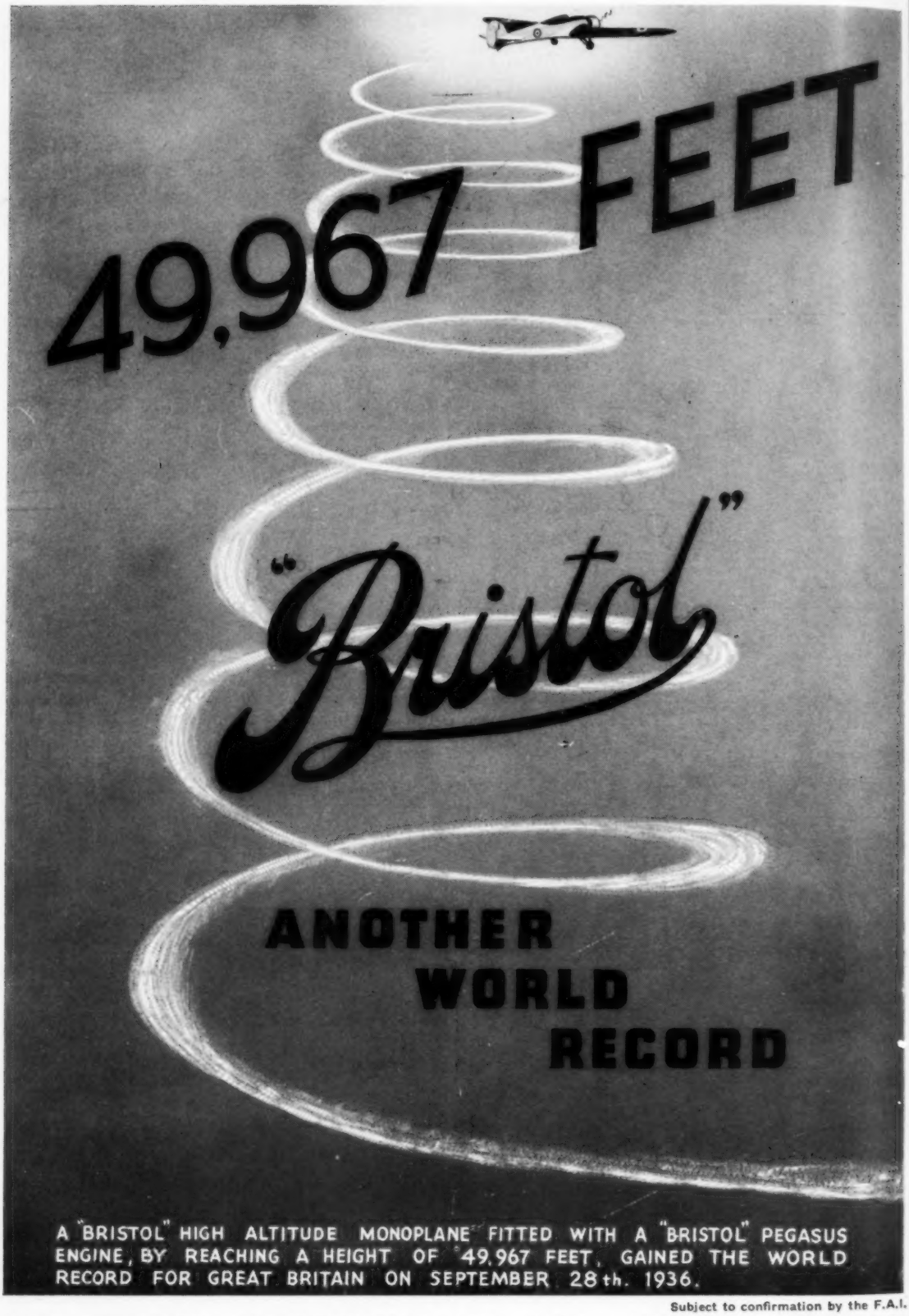
49,967 FEET
"Bristol"
ANOTHER
WORLD
RECORD
A "BRISTOL" HIGH ALTITUDE MONOPLANE FITTED WITH A "BRISTOL" PEGASUS ENGINE, BY REACHING A HEIGHT OF 49,967 FEET, GAINED THE WORLD RECORD FOR GREAT BRITAIN ON SEPTEMBER 28th. 1936.

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FLIGHT

The AIRCRAFT ENGINEER AND AIRSHIPS

FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

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Another Australia Record

MISS JEAN BATTEN is truly a remarkable young woman, and not only her native land of New Zealand but the whole Empire is proud of her skill and endurance. What with Lovelock the Olympic runner and Jean Batten the air pilot, New Zealand is doing its full share, and rather more, in upholding the athletic prowess of the British Empire. If only Clouston had had better luck in the Johannesburg race, there might have been a third name to add to the list of New Zealand champions.

Miss Batten set off with the modestly expressed hope of cutting a week off her previous time between England and Australia, which was just under fifteen days. She has not only accomplished that, but has beaten all the solo records set up by men pilots. The tragic fiasco of the Schlesinger race has brought home to everybody how many things may go wrong on a long flight when aeroplane, engine, and pilot are taxed to the uttermost. These long-distance flights against time, though they may teach no useful lessons for the benefit of air transport, certainly call for great powers of endurance on both the human and the mechanical side, and even more than that they demand skill and experience on the part of the pilot. Just when the results of the race had depressed everybody, this fine flight of the New Zealand girl comes as a welcome tonic to raise our spirits.

Timor and Tasman

Miss Batten's arrival in Australia did not complete her programme or fulfil her ambitions. She aimed at reaching New Zealand. That meant crossing some 1,400 miles of the Tasman Sea, which, though not like the Timor Sea in being invariably described as "shark-infested," has an evil reputation for storms. Some years ago, after some aeroplanes had been lost in that sea and the R.A.A.F. had spent much time and run considerable risks in searching, the Commonwealth Government talked about prohibiting dangerous flights from leaving Australia. Shortly afterwards Kingsford-Smith and Ulm made the flight in their three-engined *Southern Cross*, and no objection could be, or was, taken to that effort. Now it is stated that the Government has no power to prevent the Gull from flying on, though it disapproves. As Miss Batten had covered the longer stretch of the South Atlantic in a Gull, she was not likely to shrink from the shorter sea crossing, despite its stormy reputation.

It is strange to note the good fortune which attends flights over the Timor Sea, for all its fishy reputation in Fleet Street. Not one of the large company of record-breakers has ever come to serious grief between the Malay archipelago and Darwin or Wyndham. The nearest thing to a disaster was the recent loss of direction by the Monospar Croydon, and even then a safe landing was made on a coral island, and the four airmen were picked up unharmed. Everyone will hope that the much more unruly Tasman Sea will be really kind to Miss Jean Batten.

Towards an Ideal

ALREADY, in the early days of flying, at least one scientist realised the importance of suppressing all aircraft parts which did not directly contribute to lift. Dr. Hugo Junkers took out a patent—in 1910, we believe—on a design in which engines, passengers and crew were contained entirely within the wing. For a number of years no very serious attempt was made to approach that ideal. In fact, the knowledge then existing did not permit the translation of Dr. Junkers' idea into practical aircraft engineering. Wing sections were unstable and required a tail to counter their instability; directional control was imperfectly understood (although F. W. Lanchester did, in an early work, use the expression "catastrophic instability"), and lateral control was only just beginning to emancipate itself from the original Wright wing-

warping system. Moreover, the knowledge of stresses in aircraft structures was so incomplete that no one could, with any degree of confidence, have undertaken the design of an aeroplane large enough to accommodate human beings inside its aerofoil section. The structural materials available were far from having attained the exalted characteristics now looked upon as commonplace, and altogether there were many reasons why progress was slow.

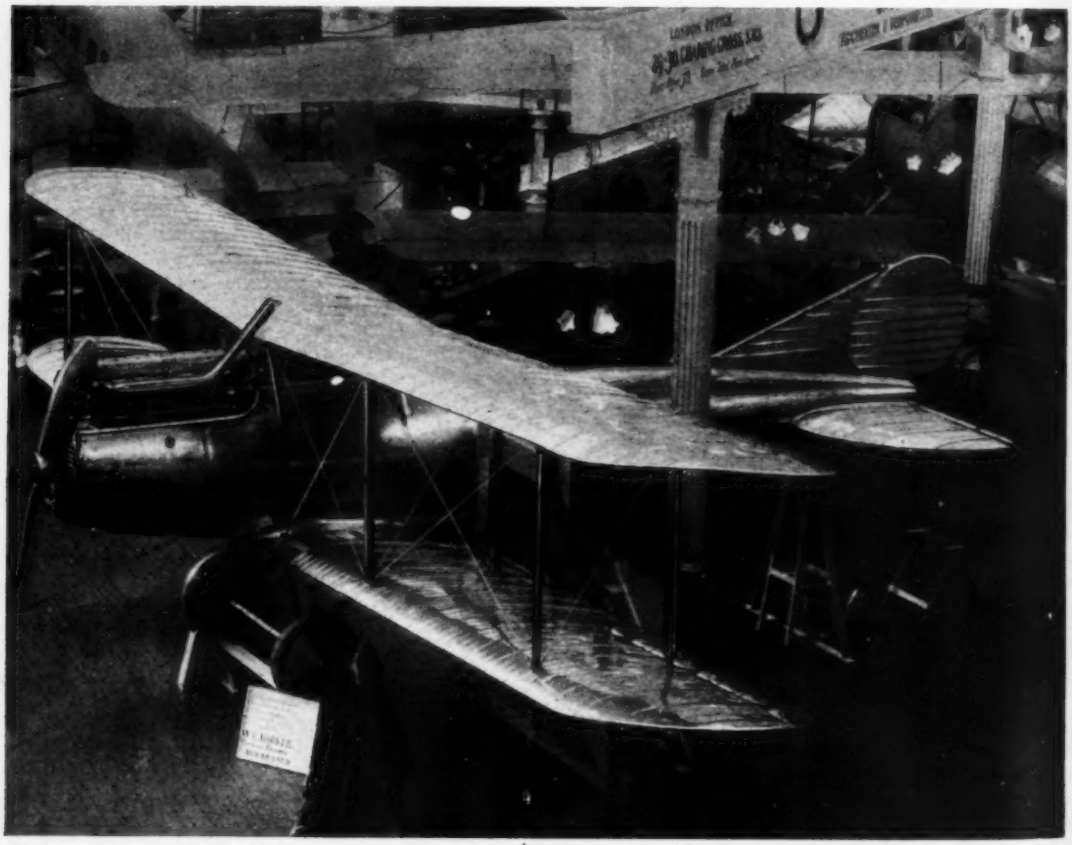
Perhaps it would be correct to say that not until the introduction of all-metal construction, and particularly stressed-skin construction, did it become at all feasible to revert to Dr. Junkers' original "Nurflügel" or "all-wing" aeroplane. Long before that, however, the importance of suppressing all excrescences had been realised, and during the last five or six years a general "cleaning-up" has taken place which has resulted in a very considerable improvement in the aerodynamic fineness of aeroplanes. This "cleaning-up" has obviously been in the nature of an evolution rather than a revolution, but the rate at which performance has gone up is evidence that the progress made is not all due to the engines.

The Cantilever Compromise

It is not necessary to be an aerodynamic expert in order to see certain fairly obvious reasons why the present compromise between the all-wing aeroplane ideal and the somewhat imperfect but practically possible modern aeroplane has taken the form of a cantilever monoplane, usually of the low-wing type, in order to facilitate the retracting of the undercarriage into the wing interior. That even this compromise has not been achieved without certain difficulties was made abundantly clear by Dr. Lachmann in the paper of which he read a summary before the Royal Aeronautical Society last Thursday. That finality has by no means been reached also emerged from the paper, although it seems unlikely that the rate of progress of the last five or six years can be maintained during the next five or six.

Although Dr. Lachmann's conclusion that the fully-stressed shell type of wing is superior to the "concentrated flanges" type was not seriously challenged during the verbal discussion which followed the paper, it seems likely that written contributions may bring out points in favour of the latter, notably on the question of cost, which may show greater differences than the weight economy basis, at least until a good deal more experience has been accumulated. Spot welding, for example, would cheapen production considerably.

As a summary of the present position Dr. Lachmann's paper was extremely interesting, thorough and very fair. His claims in favour of wing tip slots combined with partial flaps were backed up by other speakers, and it was difficult not to agree that, on the whole, this combination is a very good one for obtaining high lift on a tapered wing of good structural efficiency without running into trouble with dropping wing tips.



A METAL-CLAD PIONEER: Metal-clad construction was dealt with in Dr. Lachmann's R.Ae.S. Lecture referred to above and reported on pages 380-382. This *Flight* photograph shows the Short "Silver Streak" which was exhibited at the Olympia Show of 1920. The machine had metal monocoque fuselage and metal-covered wings.

The Outlook

A Running Commentary on Air Topics

The "Pou" Position

THE outlook is somewhat dark for *Pou-du-Ciel* enthusiasts. Tests made in the French full-scale wind tunnel at Chalais-Meudon have indicated that by giving the front wing a larger positive angular range full control in a dive could be secured. But in spite of this the *Pou* has been banned by the French Air Ministry, the argument apparently being that, although the increase in front wing angle is capable, aerodynamically, of providing full control, the panicky use of this control might prove too much for the structure. Also, the machine does not, even with the more powerful of the engines that are usually fitted, comply with the French Air Ministry's take-off requirements.

The Royal Aircraft Establishment at Farnborough has now issued its report on the very brief tests carried out there in the 24ft. tunnel. As far as the tests went, they appear to have tallied with the French results. The maximum setting of the front wing of the machine tested was +4.8 deg. in relation to the top of the fuselage, on which, of course, the rear wing rested direct. In the tests the fuselage top was taken as the datum line, which was, except for irregularities in rigging, the same as the incidence of the rear wing.

Down to angles of incidence of −15 deg., this maximum angle of the front wing was sufficient to give a positive pitching moment, i.e., to give recovery from a dive, but at any larger negative angle recovery could not be effected.

From the French and British test results one might logically argue that a relatively small modification, increasing the positive angle of the front wing, should do all that is necessary to ensure a cure of the diving tendency. This would be so were it not for the fact that M. Robineau, one of Mignet's closest friends and collaborators, is reported to have been flying a *Pou* so modified when he crashed and was killed some weeks ago. This seems to indicate that there is still some mystery about the controllability of the *Pou*, and it was a great pity that questions of expense did not allow the Air League to have more thorough tests made at Farnborough. As it is, the position is still inconclusive.

We hope to deal more fully with the Farnborough report next week.

Singapore's Air Garrison

MANY years ago Kipling described Singapore as Britain's "richest roadstead," and recent turns of the international political wheel have made the Lion's City (such is the meaning of the name) a pivotal point in the Empire's defence scheme. Without a great naval base in the Straits of Malacca the Royal Navy could not ensure the protection of Australia and New Zealand. A great naval base now implies also a great air base, and for a long time past work has been in progress at Singapore for the reception of more R.A.F. squadrons.

Now it is announced that No. 230 (Flying Boat) Squadron is being transferred from Home Establishment to the Far East Command, and is flying its five Singapore III boats out there from Pembroke Dock. That will be a notable increase to the air garrison. That garrison dates from the flight of four Southamptons from Plymouth to Australia. After flying all round that Dominion the flight ended up at Singapore, and became No. 205 (F.B.) Squadron. Then No 36 (Torpedo Bomber) Squadron was moved there, and later No. 100 (T.B.) Squadron from Donibristle was added. The next increase was the recent raising of the Straits Settlements Volunteer Air Force, which is equipped with army co-operation machines. That is to be expanded to a strength of two squadrons. Now a second flying boat squadron is added.

Is It Enough?

FOR such an important place as Singapore an air garrison of two flying boat squadrons, two torpedo bomber squadrons, and two army co-operation squadrons is certainly not enough. We must expect a further increase, and it is not unreasonable to suppose that in time Singapore's strength in flying boats will be considerably greater than that of the Home establishment—perhaps we should say than that of the Metropolitan Air Force. For Home waters the latest idea seems to be that the general reconnaissance class of aircraft, at present represented by the Anson, is best suited to the work which has to be done. Being a landplane with retractable undercarriage, it is fast; and, being comparatively light, it is able to fly on one of its two engines. As it ought never to be forced down, it has no need of hull or floats. Still, for long reconnaissance over the North Sea there may still be need of flying boats.

Though landplanes may be best suited to coastal reconnaissance in Home waters, there is no doubt of the absolute necessity of giving the Far East Command an ample supply of flying boats. They have to make very long flights even in peace time, and in war they would have to reconnoitre very far over ocean and archipelago. It is held, at least by one school of thought, that for Far East work the range (and also the comfort) of a flying boat is of more importance than its speed, whereas in the Narrow Seas speed becomes of prime importance. If that doctrine is sound, then the Singapore III is a very suitable craft for the Far East. We should also like to see a couple of squadrons of Saro Londons added to the strength of Singapore.

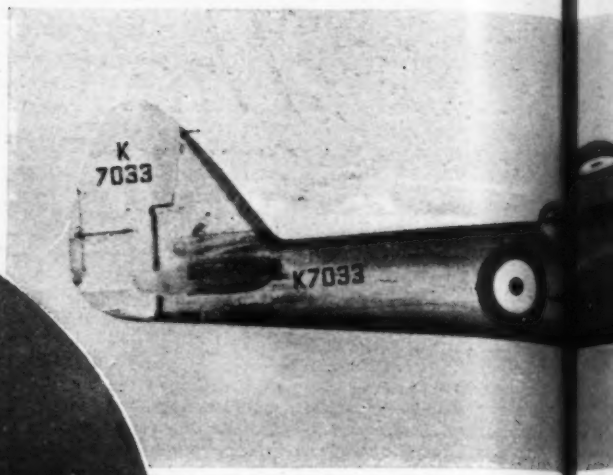
Retractable Vision

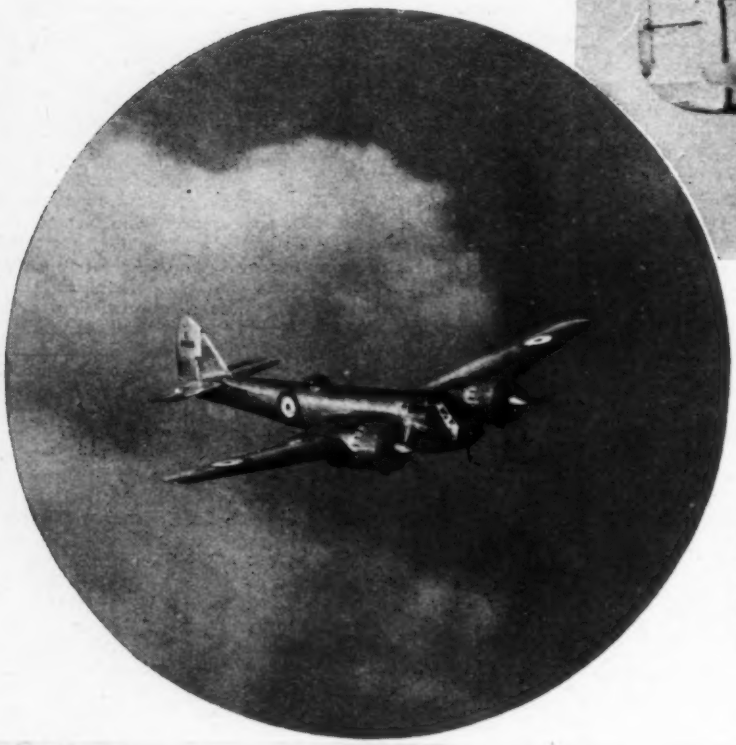
ONE outstanding innovation apparent on this year's cleaned-up racing Caudrons is the cockpit enclosure, the top of which does not project, as hitherto, from the top of the fuselage in the form of a little turret or visor, but preserves faithfully the basic aerodynamic lines of the machine. Doubtless the clean sweep so obtained from spinner to tail accounts for several highly acceptable kilometres an hour, but obviously the standard of forward view is far below the minimum acceptable for modern civil and military aircraft.

Turning to America, some preliminary data on the new high-speed monoplane being built for Capt. Frank Hawks reveals that this machine (a cantilever monoplane with Twin Wasp engine) has a retractable cockpit enclosure which, in its retracted position, fairs perfectly into the fuselage lines; outlook, as in the case of the new Caudron model, is dependent on roof and fuselage panels.

All of which is very interesting technically, and doubtless, in the aerodynamic sense, highly profitable. But, granting that Frank Hawks' machine is a "special speed job," it must be realised that it will fly for long distances (the range is 1,700 miles) in the same air as unpretentious, but life-loving folk who are subjected to quite serious enough a risk from inadequate vision while travelling in, and near, their conventional aeroplanes.

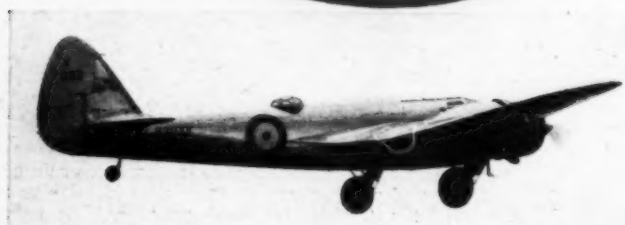
The First "Aerials" of What is Probably the World's Fastest Bomber—The Bristol Blenheim : Complete Modernity

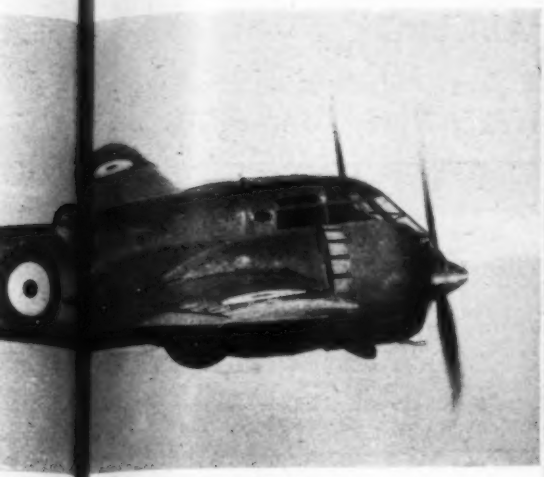




BRISTOL A

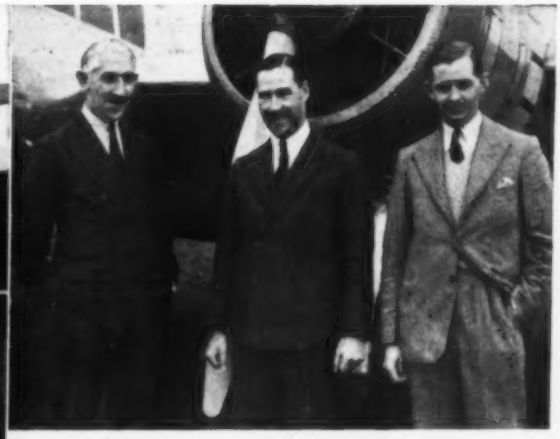
SOMETIMES an aeroplane is built which from the very start is obviously a "winner." Such a machine is the Bristol Blenheim medium bomber, now in quantity production for the Royal Air Force. These views of the prototype—a direct development of the Bristol 142 *Britain First*—go far toward showing why the Blenheim is no ordinary bomber. But a few points of aerodynamic and military





OLASHION

interest which it is permissible to indicate are: Bristol Mercury VIII engines, giving a maximum of 840 h.p. at 14,000ft.; De Havilland variable-pitch airscrews with spinners; combined exhaust collectors and deep-chord cowlings; controllable cooling; retractable undercarriage and tail wheel; flaps; the absence of a forward gunner; the exceptionally fine outlook; and the general compactness of the aircraft. The civil progenitor of the Blenheim did 268 m.p.h. with Mercurys of the previous series.



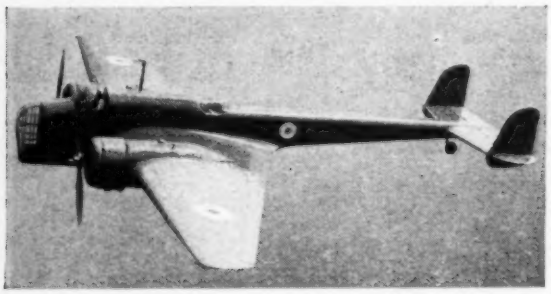
Bristol's Testing Trio: Flt. Lt. C. F. Uwins (the "Chief"), F/O. A. J. Pegg and F/O. C. A. Washer. Lately they have been engaged in flying the Blenheim, the Type 130 bomber transport and various "flying test beds" for Bristol engines.

TAPERED WINGS

Present Position Reviewed : Towards the "All-wing" Ideal : Improved Aerodynamic Efficiency Without Extra Weight : Last Week's R.Ae.S. Lecture

THE paper read by Dr. Ing. G. V. Lachmann, F.R.Ae.S., before the Royal Aeronautical Society last Thursday under the title, "Aerodynamic and Structural Features of Tapered Wings," was a formidable tome, in spite of the lecturer's apology for its piecemeal character and incompleteness.

Flight readers will already be familiar with some of the aerodynamic features of tapered wings from a series of articles on the subject which have appeared in *Flight* and its monthly technical supplement *The Aircraft Engineer*. Mr. P. P. Nazir started the ball rolling with his lecture on stalling of tapered wings to the Students' Section of the R.Ae.S. on November 19, 1935, a summary of which was published in *The Aircraft Engineer* of November 28, 1935. This was followed by an article by Dr. Lachmann in *Flight* of January 2, 1936, with the same title. Mr. W. R. Andrews, who was at that time on the technical staff of A. V. Roe and Co., Ltd., and who is now chief designer to the British Burnelli concern, retaliated in *The Aircraft Engineer* of January 23, 1936, in which he rather challenged some of Dr. Lachmann's statements and conclusions. To this, Dr. Lachmann replied in *The Aircraft Engineer* of February 27, 1936. Other articles, by Mr. W. E. Gray, of



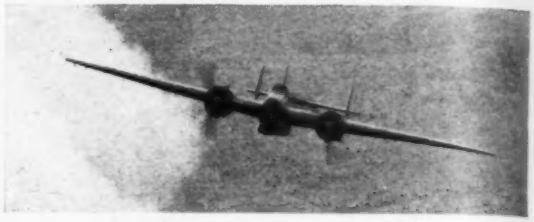
The H.P.52 is an example of the cantilever wing with pronounced taper and swept-forward trailing edge. (*Flight* photograph.)

particular interest because they were illustrated by photographs of tufted wings in actual flight, appeared in *Flight* of July 16 and 23, 1936, and September 3, 1936. Mr. Grays' explanation of the origin of the stall in tapered wings, and particularly his arguments concerning the effects of a back-swept leading edge, were not universally accepted, and Messrs. C. N. H. Lock (of the N.P.L.) and C. H. Latimer-Needham, as well as Mr. W. R. Andrews, have argued the matter in the Correspondence columns of *Flight*.

On the structural side, also, we may claim to have done something towards shedding light on problems of cantilever and tapered wings by a number of articles in *The Aircraft Engineer*, and on the assumption that regular *Flight* readers have followed the subject over a period of several months, we will confine ourselves here to giving the main conclusions arrived at by Dr. Lachmann in his recent paper.

In his introduction Dr. Lachmann pointed out that the final logical result of the tendency to suppress all components which do not contribute useful lift is the "flying wing" (or all-wing aeroplane as *Flight* prefers to call it, all wings being flying wings—Ed.) with engines, passengers or military load housed inside. Certain difficulties still prevented that ideal being reached, the present compromise being a tapered cantilever wing with streamlined fuselage and a cantilever tail unit.

The lecturer pointed out that the modern monoplane is not

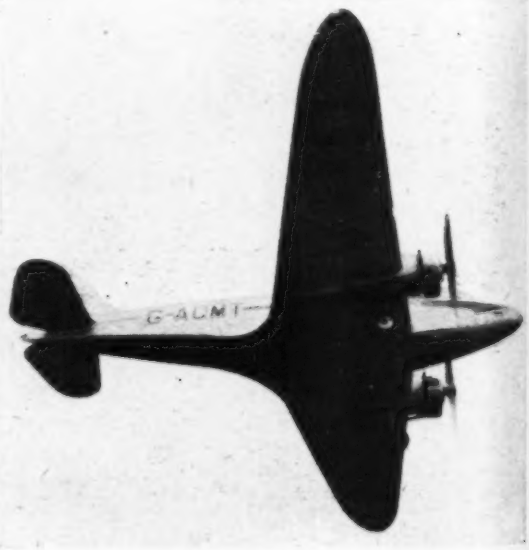


The H.P.52 in front view shows further evidence of the "all-wing" tendency. (*Flight* photograph.)

a result of superior aerodynamic characteristics of the tapered wing, but that, just as the rectangular wing of constant thickness was the most rational solution for a braced biplane, the wing tapered in plan form and thickness was the most rational solution for the cantilever monoplane. The new variables which the cantilever introduced, namely taper ratio and distribution of thickness and of wing section along the span, made the design problem a little more complex.

An examination of the fundamental structural effects of taper ratio led the lecturer to the conclusion that, although taper ratio had a definite effect in reducing bending moments, it was not sufficient to explain the superiority of a tapered over a rectangular monoplane wing from the point of view of structural economy. The decisive design criterion for cantilever wings was torque stiffness, and Dr. Lachmann found that high taper ratios offered definite structural advantages from the point of view of strength in bending and torsional stiffness. He did not consider that it was possible to determine optimum taper ratios embracing both the structural and aerodynamic effects as the variables are too many and too indefinable. This difficulty was reflected in the wide variety of taper ratios employed by different designers, but generally speaking there seemed to be a tendency towards the use of higher taper ratios in view of the structural advantages.

In the concluding portion of his paper, Dr. Lachmann examined the relative merits of the two main types of cantilever



Medium and almost symmetrical taper, with very pointed tips, are features of the Airspeed Envoy. (*Flight* photograph.)

wing structure, namely, the type which makes use of concentrated flanges and the fully-stressed skin type. Without claiming to have gone into all the minor details which affected structural weight, he came to the conclusion that the wing weight as a percentage of all-up weight of the aircraft was 18.74 per cent. for the concentrated flange type and 16.126 per cent. for the stressed-skin type. This low structure weight was, however, only attainable if the stressed skin was highly efficient from the point of view of obtainable compression stress. More efficient in this respect than a flat skin with riveted-on stringers was a combination of corrugated and flat skin.

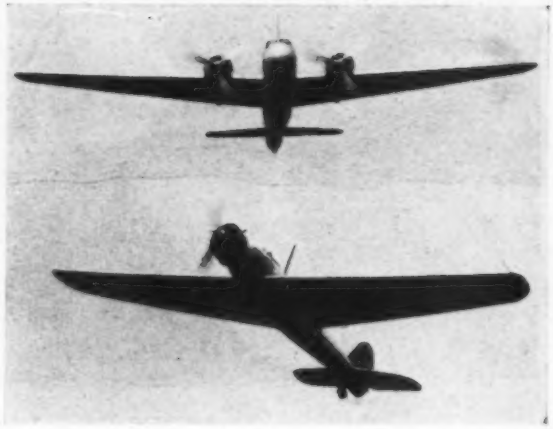
Aerodynamic Aspects

After pointing out that the purely structural viewpoint has to be tempered by a consideration of the aerodynamic characteristics as affected by taper ratio, Dr. Lachmann turned to the very complicated problems of the aerodynamic characteristics of tapered wings. He dealt with these under the following heads: Lift distribution; mean aerodynamic chord; damping in roll, and aileron efficiency; stalling of tapered wings; tapered wings and longitudinal stability; tapered wings with high-lift devices.

After paying a tribute to the work of the late Mr. Glauert in connection with a simple method of calculating the lift distribution across the span of a wing of any given regular plan form, Dr. Lachmann turned to the associated subject of the conception of an aerodynamic mean chord of a tapered wing. This had, he said, been found very helpful in determining the balancing loads for a new design, and also in comparing the relative c.g. positions of aeroplanes of varying plan form. It could also be used for estimating the effect of sweep-back on pitching moments. By introducing this conception of an aerodynamic mean chord, the tapered wing could be reduced to an equivalent wing of constant chord, and the moment about the leading edge of this wing could be expressed very simply. (Here we may recall that an article on this subject by Mr. J. R. Crean, one of Dr. Lachmann's assistants, was published in *The Aircraft Engineer* (monthly technical supplement to *Flight*) of April 30, 1936.—ED.)

On the subject of damping in roll and aileron efficiency, Dr. Lachmann found that damping in roll decreased with taper ratio, a result which had recently been confirmed by Irving and Batson of the N.P.L., and that aileron efficiency increased with taper ratio at angles below the stall. In America it had, however, been found that just above the stall, the rolling moment fell off almost completely in the case of the highly-tapered wing (ratio 5:1), and adverse yawing moments of great magnitude occurred. The better response to ailerons and its resulting effect on manœuvrability afforded by the highly-tapered wing could, therefore, only be utilised if care was taken to maintain a sufficient degree of lateral control at and beyond the stall.

The Monospar Croydon is an example of high taper ratio and swept-back leading edge. (*Flight* photograph.)



Nearly straight leading edge, swept-forward trailing edge and high aspect ratio are combined in the Vickers Wellington and Wellesley monoplanes, which are of geodetic construction. (*Flight* photograph.)

This brought Dr. Lachmann to the subject of stalling of tapered wings, and this section of his paper was largely a reference to, and comment upon, the already-mentioned articles published in *Flight* and *The Aircraft Engineer*. The tendency of a machine with wings of tapered plan form to "drop a wing" could be combated to some extent by simple "wash-out" (i.e. a gradual decrease in geometric angle of incidence from root to tip), by wash-out combined with change of camber, and by wing tip slots.

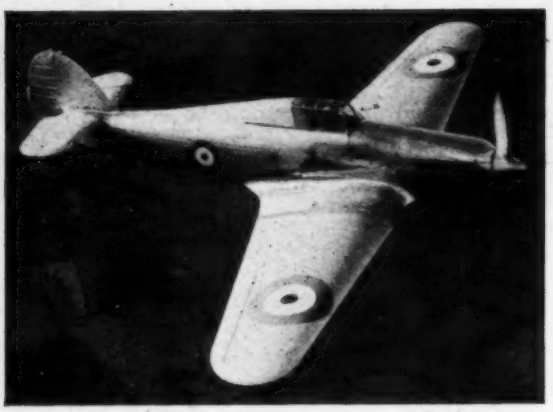
Longitudinal Stability

Dr. Lachmann explained that most designers had found that it was more difficult to secure satisfactory longitudinal stability in a monoplane with tapered wings than in the old biplane, and had often found it necessary either to shift the c.g. much farther forward, or to increase the tail volume considerably beyond the values which gave satisfactory results in biplanes. Dr. Lachmann probably earned the gratitude of many designers by his explanation of the main causes of this rather mysterious longitudinal instability.

Taking as a basis for his explanations an analysis of wind tunnel tests of a model of a twin-engined monoplane having a taper ratio of 4:1 and a tail volume of 0.55, Dr. Lachmann found a large influence of the engine nacelles and fuselage on the total pitching moment. At 6 deg. incidence, the combined unstable pitching moment due to nacelles and fuselage was about twice as large as the wing moment alone. The effect of slipstream on overall pitching moment was relatively small.

Apart from the screening of the tail by a wing of large chord in the centre, the lecturer found that the stabilising effect of the tail surface was reduced by a concentration of downwash behind the centre portion of the wing, due to taper. Wing fillets at the junction of fuselage and wing roots had a de-stabilising effect, and Dr. Lachmann referred to the results published by Mr. Hibbard of the Lockheed company, who had ultimately removed the fillets and thereby obtained increased stability and slightly better performance. Fillets, once so much in vogue, were gradually going out of fashion again. By careful design it was possible to avoid expansion at the juncture of wings and body without using fillets.

The development of fast clean monoplanes with high wing loadings had forced upon the designer the use of special devices for increasing litt and drag when landing. The lecturer dealt with the following types: Split flaps; slotted flaps; Fowler flaps; tip slots combined with partial flaps; partial flaps combined with drooping ailerons; and complete lift slots combined with flaps. Not unnaturally, Dr. Lachmann concluded that the slotted flap offered the best solution, as it gave high values of maximum lift coefficient and of drag at large flap angles (60 deg.), and an increase in lift without increase in drag at smaller (20-30 deg.) flap angles, which could be used for improving the take-off. The hinge moments were low and therefore the control mechanism was light and simple (see diagram). In connection with the Fowler wing, Dr. Lachmann



"Concentrated flanges" and fabric covering. The Hawker Hurricane is orthodox in its structure but shows a fairly pronounced taper. (*Flight* photograph.)

made the interesting statement that in America, during recent full-scale flying tests, difficulty was found in connection with using the full lift available, the strong downwash from the wing being deflected upwards on to the tail, so that it was difficult to keep the tail down and the angle of incidence of the wings up to that giving maximum lift.

Summarising his conclusions concerning the effectiveness of different high-lift devices, Dr. Lachmann gave the following figures. He used $C_L$max but as *Flight* readers will be more familiar with British "absolute" units, we have converted Dr. Lachman's $C_L$max into $k_L$max.

	$k_L$max.
Partial flap, 50 per cent. of semi-span ...	0.9-0.95
Partial flap and tip slot (50 per cent. of semi-span and 20 per cent. of chord) ...	1.05-1.10
Fowler wing (partial flap)	1.15-1.20
Partial flap combined with drooping ailerons ...	1.2
Partial flap, drooping ailerons and tip slots ...	1.325
Complete lift slots plus partial flaps	1.25-1.40

Taking average present-day wing loadings as 20lb./sq. ft., Dr. Lachmann pointed out that if we go to wing loadings of 40lb./sq. ft. and desire to retain the present landing speeds, high-lift devices known at present are not quite equal to it, and it will be necessary either to admit higher landing speeds or to look forward to some new means of increasing maximum lift. The only means in sight so far, Dr. Lachmann said, was to suck away the boundary layer. Tests at Langley Field in America had indicated that maximum lift coefficients of 1.75 ("absolute") could be obtained at a relatively small expense of horse power. A drawback was that this high lift occurred at very large angles of incidence, and radical changes would have to be made in aircraft design to make use of it.

Points from the Discussion

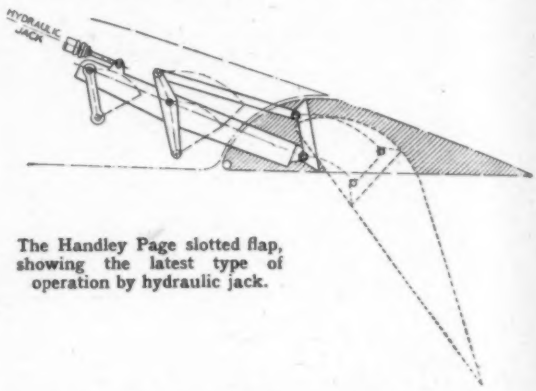
Dr. Lachmann was perforce obliged to read a summary of his paper, which was too long to be read *in extenso*, and the illustrations were run through quickly on the screen, so that there was little time for many members of the audience to digest the information. Consequently, the comments to be sent in for publication in the *Journal* are likely to go into a great deal more detail than was possible in the verbal discussion which followed the reading of the paper. Nevertheless, several points raised during the verbal discussion are of general interest.

In one of first of the series of articles which he wrote for *The Aircraft Engineer* when that was started as a supplement to *Flight* in 1926, Mr. J. D. North pointed out that if ten designers of approximately equal experience contributed to a common fund, each would stand to receive nine times as much information as he gave. For many months Mr. North continued to contribute valuable material to *The Aircraft Engineer*, but other chief designers did not quite follow suit; many of them have not done so to this day, finding various excuses for their lack of support. It was probably something similar to Mr. North's argument which was in the mind of MR. F. HANDLEY PAGE when he asked members of the audience to come forward with their own experiences in order that the many and difficult problems connected with tapered wings might be solved as quickly as possible.

The question of cost was not touched upon by Dr. Lachmann, and one or two speakers asked, during the discussion, that a section dealing with this might be added to the paper before publication in the *Journal*. MR. HOLLIS WILLIAMS volunteered the piece of interesting practical information about stalling of tapered wings that General Aircraft, Ltd., had found their two types, the S.T.25 with trailing edge swept forward and the Croydon with wings very much swept back, equal in the matter of slow stalled turns without "dropping a wing."

With reference to Dr. Lachmann's remarks concerning the effects of wing twist combined with change of camber towards the wing tip, MR. C. C. WALKER, of De Havillands, said his firm has tried the effect not of increasing the camber at the tip but of keeping the camber the same and increasing the curvature of the upper surface on the assumption that it was this surface which was most closely connected with stalling. This expedient had achieved a considerable measure of success in delaying the stalling of the wing tips. He also asked, with reference to Dr. Lachmann's remarks about the greater torsional strength of the stressed skin type of construction than of the "concentrated flanges" type, whether the torsional stiffness, which was what really mattered most, was also greater. The two things were not the same.

Confirmation of Dr. Lachmann's claim that wing tip slots in conjunction with partial flaps provided a very useful increase in lift without the necessity of attaining very large angles of incidence, was provided by MR. W. E. W. PETTER, of Westlands.



The Handley Page slotted flap, showing the latest type of operation by hydraulic jack.

An interesting light was thrown on the stalling of tapered wings (and on the screen) by MR. H. B. IRVING, of the N.P.L., who had a slide shown which indicated that on a wing with swept-back leading edge a small area near the root and towards the trailing edge stalled first, whereas on a wing with trailing edge sloping forward the stalled area developed first a short distance inside the wing tip. For higher aspect ratios, he explained, the beginning of the stall might be different.

Ease of construction was referred to by one speaker, who rather doubted that the stressed-skin type could be quicker than the "concentrated flanges" type. This question was actually dealt with in the advance copy of the paper, and in his reply Dr. Lachmann stated that at Cricklewood they had introduced the system of machine-riveting the skin covering in large panels, which were then joined together on the job with a minimum of hand-riveting.

Advanced Aeronautics

A SYLLABUS issued by the Department of Aeronautics of the Imperial College of Science and Technology, South Kensington, gives details of the aeronautical course. The course is mainly a post-graduate one and students are expected to have passed through a systematic training in physics or in one of the branches of engineering, including a fairly high standard in mathematics. They should have graduated A.C.G.I., A.R.C.S. or B.Sc., or have obtained a recognised equivalent standard. The syllabus is as follows:—Aerodynamics (Prof. Bairstow); aircraft design (Prof. L. Bairstow and Asst. Prof. F. T. Hill); materials of aircraft and aero engine construction (Asst. Prof. Hill); aircraft structures (Asst. Prof. Hill and Dr. Roxbee Cox); aero engine theory and design (Mr. H. Constant); air navigation and aircraft instruments (Mr. A. P. Rowe); and meteorology (Prof. Brunt).

The equipment includes two wind tunnels, and tanks for research into fluid motion.

British Timken Engineer's Visit to America

MR. B. H. RILEY, A.M.Mech.E., sales manager of the engineering division of British Timken, Ltd., Birmingham, is now on a visit to the United States in order to study the latest and advanced applications of anti-friction bearings more recently developed in that country.

THE FOUR WINDS

ITEMS OF INTEREST FROM ALL QUARTERS

TOMMY ROSE, Jack Bagshaw and their Schlesinger-racing B.A. Double Eagle have designs on the Cape-England record.

American private interests are seeking to buy or rent one of the two new Zeppelins which are on the stocks.

In Siberia, squads of fire fighters have been dropped by parachute from aeroplanes to deal with forest fires in regions that are inaccessible by road.

Seventy-five officers lost their quarters, equipment and personal effects when a fierce fire gutted 102 huts at Tern Hill aerodrome last Wednesday week.

An Austrian aeroplane left Vienna last week for Venice with 700 young swallows which had been found, cold and hungry. A number of similar trips were contemplated.

The trophy for the Johannesburg race was presented to Mr. C. W. A. Scott and Mr. Giles Guthrie at that city last Tuesday week. They flew it home in the victorious Vega Gull.

It was announced that Mr. Schlesinger had given £6,000—the part of the prize-money remaining unclaimed—to the dependents of Capt. Max Findlay and Mr. H. A. Morgan, who were killed during the race.

The average speed of all domestic air lines in the United States during the first six months of this year is said to have been 147.5 m.p.h. and the average length of a passenger's trip 425.8 miles.

Kurt Björkvall, the Swede who left New York at 7.30 a.m. last Tuesday week on an attempt to fly direct to Stockholm, was picked up from the sea by a French trawler 100 miles off the west coast of Ireland on the evening of the following day. His Bellanca was lost.

"STAND FROM UNDER." Martin bombers of the U.S. Army Air Corps disposing of 100-lb and 300-lb. bombs at 14,000 feet for the education of Officers of the Army War College in Washington.

The £80 fuel bill for a transatlantic crossing by the upper component of the Short-Mayo composite machine mentioned last week is an average figure for out and home trips. The engines are fully supercharged Napier Rapiers.

Bristols are building a new altitude machine, similar to the 138 record-breaker, but with a liquid-cooled Rolls-Royce engine, no details of which have so far been made known.

A model of an aerodrome lighted in accordance with the latest requirements for night flying will be among the exhibits at the opening meeting of the Illuminating Engineering Society, to be held at the Lighting Service Bureau, 2, Savoy Hill, London, W.C.2, on October 13.

As an experiment, a small detachment of Indian troops was flown from Rawalpindi to Chitral Fort over difficult and dangerous frontier country, impassable to motor vehicles. The test flight, which proved a great success, took only five hours as against six weeks, the usual time.

Intending to use normal public transport facilities, chiefly aeroplanes, ships and trains, three American journalists set out from New York on September 30 in the Zeppelin *Hindenburg* to try to beat the round-the-world record for general travel of 23 days 15 hr. 21 min. set up in 1928.

"ERE THE WINTER STORMS BEGIN." Military versions of the diesel-engined Junkers Ju. 86 monoplane playing their part in recent German harvest festival celebrations near Hamelin. This is believed to be the first published picture of machines of this type.

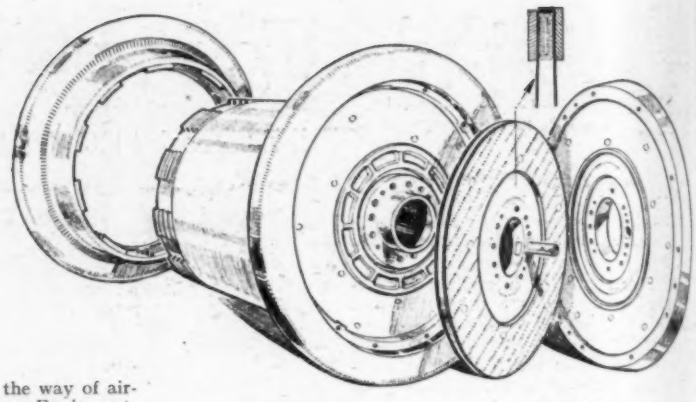
Twenty-five Years Ago

(*From "Flight" of October 14, 1911.*)

"While some of us are liable to get excited over the *canard* movement in French aeroplane design, we must not lose sight of the fact that a British-built tail-first machine—and a very good one, too—has been flying almost daily for the last 18 months within 6 miles of London, to wit, Mr. Barber's Valkyrie. It is really very cheering to notice that the French constructors are falling in line with a point in design of which our most noted English pilot constructor has been the lonely but nevertheless sincere advocate for many months past."

SOMETHING NEW IN BRAKES

Unorthodox and Interesting Features of the Avery Equipment

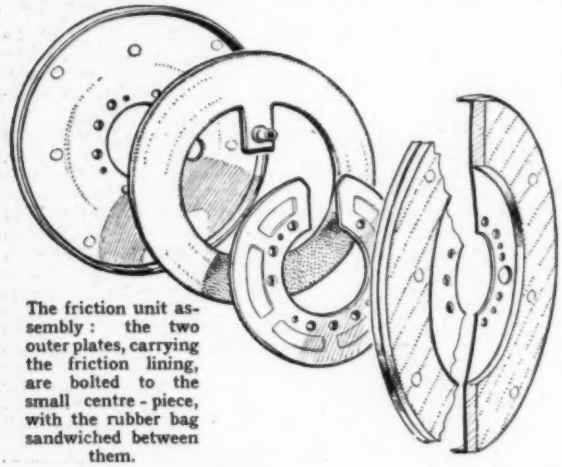


A typical Avery flat-base wheel assembly: on the right is the cover plate, which also forms one brake drum; next is the expansile friction unit; then the hub (and other brake drum); and on the left is the quickly detachable rim. The inset is a section through the friction unit, in which an inflatable bag forces the friction linings into contact with the brake drums.

SOMETHING quite out of the ordinary in the way of aircraft brakes is being produced by Avery Equipment, Ltd., after a long period of development, from the designs of Mr. W. L. Avery, who is very well known in the aircraft industry as a designer of braking equipment.

The Avery brake has so many ingenious and unorthodox features that it is difficult to know where to begin. The "heart" of the device, the actual braking unit, is, perhaps, the most interesting. Instead of disposing his brake shoes in the orthodox manner, Mr. Avery mounts them as vertically disposed rings, rather after the fashion of clutch plates. There are two of these rings, and each is mounted, friction surface outwards, on a slightly dished metal centre.

These two friction discs are normally mounted on their central axle flange so that their peripheries are in contact, or would be were it not for the fact that sandwiched between them is an annular rubber-composition bag to contain the operating hydraulic fluid or air—either can be used. The discs being secured to the axle flange at their centres, it will be seen that when the bag is inflated the two friction linings



The friction unit assembly: the two outer plates, carrying the friction lining, are bolted to the small centre-piece, with the rubber bag sandwiched between them.

are forced apart and will exert a braking effect on the brake surfaces facing them. The inherent resilience of the dished plates provides ample pull-off energy as soon as pressure in the bag is released. Also, this resilience allows the pressure to be exerted evenly over the whole area of the friction surfaces.

This scheme, and the method of mounting the unit in the wheel, means that it is literally impossible for any dirt, oil or moisture to reach the friction surfaces. As an additional safeguard, the edges of the discs carrying the friction linings are lapped one over the other, thus forming an additional seal.

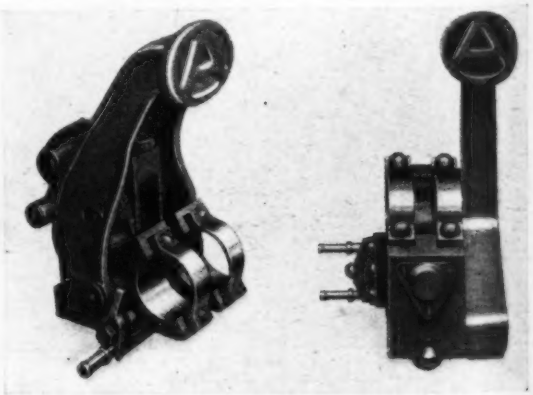
The brake is applied in a number of forms to various types of wheels, but in all cases it becomes an integral part of the wheel, though the unit remains very quickly detachable.

The heading illustration shows the Avery combined brake, hub, and flat-base rim as supplied for a well-known make of military machine. On the right is seen the cover plate, also forming one side, as it were, of the brake drum; next is the friction unit, and behind that the main hub and wheel, constituting the other half of the brake drum. Another interesting feature of the design is visible on the left of the sketch, where the method of fitting the detachable rim is seen. This works rather on the gun breech principle (though the teeth seen are not a screw thread), and locating plungers secure the rim firmly in position.

In another quickly detachable type, in which a well-base rim is used, the complete wheel may be said to be in three components: the axle, carrying the friction unit; the hub, forming the brake drum and entirely enclosing the friction unit; and the wheel, which is a sliding fit over the hub and is secured by three nuts. A streamlining disc, secured by spring-loaded studs, is fitted to one side of the wheel. The outstanding advantage claimed for this type—and, indeed, for all the Avery brakes—is that there is no overhang of the wheel, and the load is transmitted evenly to the axle on both sides. Lightness and strength are also strongly emphasised.

No less ingenious is the operating mechanism, though space does not permit a detailed description. The chief feature is a cam action in the pedal by which the early travel is greatly magnified; thus the initial movement of the pilot's ankle gives rapid displacement of the fluid. As the foot pressure begins to rise, the control gradually reverses the first effect until, towards the end of the stroke, when displacement need only be small, the force exerted becomes large. Other details are concerned with the connections of the hydraulic system. One of these is a coupling embodying spring-loaded sealing plungers which, the moment the gland nut is loosened, seal each end of the pipe and prevent the ingress of air, thus obviating the troublesome priming process.

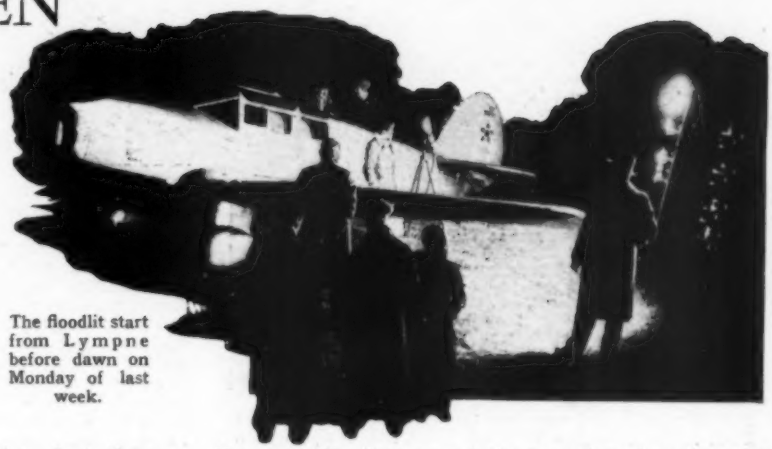
The makers are Avery Equipment, Ltd., 104, The Green, Twickenham, Middlesex. Mr. A. V. Nicolle, B.Sc., A.M.I.C.E., is managing director.



Two of the several varieties of Avery brake control pedal.

MISS BATTEN SUCCEEDS AGAIN

Her Characteristically Good Navigation and the Reliability of the Gipsy Six Gull Lower the Australia Solo Record to 5 Days 21 Hours 3 Minutes



The floodlit start from Lympne before dawn on Monday of last week.

THE solo "record" from England to Australia captured for the second time in two years, together with five other unofficial records within the period, including Lympne to Port Natal and the South Atlantic crossing; and still not satisfied!

These excellent performances stood to the credit of Miss Jean Batten as she prepared to leave Sydney on her final 1,400-mile hop across the Tasman Sea to New Zealand.

Miss Batten arrived at Port Darwin, Australia, at 1.13 G.M.T. on Sunday morning, 5 days 21 hr. 3 min. after leaving Lympne Aerodrome, thus beating the time of Mr. H. F. Broadbent (Gipsy Six Gull) by 24 hr. 16 min.

The route chosen was *via* Marseilles, Brindisi, Nicosia, Baghdad, Basra, Karachi, Jodhpur, Allahabad, Calcutta, Akyab, Bangkok, Penang, Singapore, Batavia, Rambang and Koepang. Miss Batten was lucky to meet good weather over the majority of the route, and, thanks to her skill as a pilot and navigator and the reliability of the Gipsy Six engine powering her almost standard Percival Gull, the journey was uneventful. Extra petrol tanks are fitted in place of the two normal passenger seats, considerably increasing the standard Gull range of 640 miles, but on only one stage of the Lympne-Darwin journey were they filled to capacity.

After a slight delay at Port Darwin caused by a binding brake, Miss Batten took off again for Charleville at 9.35 p.m. G.M.T. on Sunday night *en route* for Sydney, which she reached at 4.30 a.m. on Tuesday.

The credit due to Miss Batten is in no way lessened when her time is compared with that of C. W. A. Scott and the late T. Campbell Black, set up in a special racing aircraft in the MacRobertson Race, namely, 2 days 4½ hr.

G.A.P.A.N. HONOURED

H. R. H. The Duke of Kent Becomes First Permanent Grand Master : Official Presentation of Trophies

OCTOBER 12, 1936—last Monday—was a red-letter day for the Guild of Air Pilots and Air Navigators of the British Empire, for on that day His Royal Highness the Duke of Kent, K.C., K.T., was installed as the first Permanent Grand Master of the Guild. The occasion was the annual reception of the Guild, held at the Mansion House, and a very distinguished gathering witnessed the presentation of trophies awarded annually for specially meritorious services.

Air Commodore the Rt. Hon. F. E. Guest, Master of the Guild, recalled that this meeting marked the end of the seventh year of the life of the G.A.P.A.N., founded by the late Sqn. Ldr. E. L. Johnston and the late Sir Sefton Brancker, both of whom were lost in the R.101. The Guild was greatly honoured, Capt. Guest said, by the Lord Mayor's permission to hold its meeting in the Mansion House, the most famous hall in the City of London. Explaining the programme of the G.A.P.A.N., he said this could be described in one sentence: "To set the highest possible standard from the start for the commercial pilots of our Empire."

In flying, more than in any other form of transport, the public depended on the pilot's skill and experience. This was not sufficiently realised, and the Guild existed to make the reputation of pilots equal to their skill and to make both beyond question.

They had been encouraged in their work by the hope that some day the Grand Mastership of the Guild would be accepted by a member of the Royal Family, and that thereby the highest imprimatur of stability, efficiency and utility would be stamped on the charter of the Guild's efforts. He formally invited H.R.H. the Duke of Kent to confer upon the Guild the honour of accepting the Permanent Grand Mastership of the Guild.

In accepting the Grand Mastership of the G.A.P.A.N. His Royal Highness said that mastery of the air could be the greatest blessing or the greatest danger to mankind. The Guild was associated with that branch of flying which could not but be a blessing, because it brought nations together and created comradeship and a brotherhood of the air.

Capt. Guest explained that the Johnston Memorial Trophy was presented each year for what was considered by the Guild the best feat of navigation. Last year, owing to the death of King George, the reception was postponed, and the presentation of the trophy for 1935 to Capt. E. W. Percival for his flight to Algiers and back in 14½ hours was therefore deferred until now.

Capt. A. G. Lamplugh, Deputy Master of the Guild, accepted the trophy for 1936 on behalf of Miss Jean Batten for her flight from Lympne to Port Natal, S. America, in November, 1935.

Reliability Rewarded

A new award for reliability was a trophy presented by Miss Cumberbatch. This was presented to Major H. G. Brackley, Air Superintendent of Imperial Airways, on behalf of himself and the following eight senior captains of the company: O. P. Jones, L. A. Walters, W. Rogers, A. S. Wilcockson, F. Dismore, F. J. Bailey, H. S. Horsey, and A. B. H. Youell.

Mr. Henry Hughes presented a bubble sextant to the Master of the Guild as a token of his friendship and respect for the late Sqn. Ldr. Johnston. This instrument will be of great value to the students of the class for teaching first-class air navigators.

In conclusion, H.R.H. the Duke of Kent invested the Master of the Guild, Capt. Guest, with his badge of office, the gift of Mr. W. Austin Balls, who has lately become associated with the G.A.P.A.N. as a member of the committee which administrates the newly formed benevolent fund of the Guild.

The thatched-roof hangar on the Goodwood estate of the Duke of Richmond and Gordon, referred to in the paragraph below.

A Hangar Enhanced

PROBABLY the only thatched-roof aircraft hangar in the country, the building shown in the accompanying photograph proves that a hangar need not be a grim-looking edifice. It is on the Goodwood estate of the Duke of Richmond and Gordon and houses his B.A. Swallow. As can be seen by the end wall, a normal roof is under the thatched one, thus overcoming what insurance companies might otherwise regard as an unwelcome proposition from the fire point of view. The standard version of this hangar, with a normal roof and 30 ft. door span, can be obtained at a cost of slightly under £100; the agency is held by the Lindsay-Neale Aviation Co., 7-8, Norfolk Street, Strand, London, W.C.2.

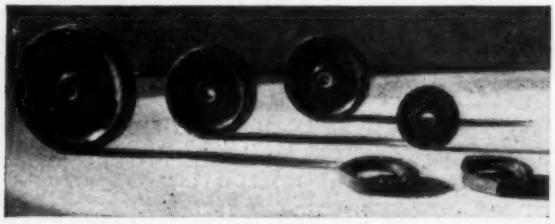
Mr. R. Lindsay-Neale, incidentally, is now very busy handling all kinds of aeronautical requirements, from purchasing good second-hand British machines for foreign clubs to selling all manner of accessories; he tells us that he is also putting through aircraft insurance at very reasonable rates.

The Lowe-Wylde Fund

CONTRIBUTIONS to the Lowe-Wylde fund totalled £920 17s. 6d. on October 1, the latest list of donations being as follows:—

	£	s.	d.
E. Holgate	10	10	0
Vacuum Oil Co., Ltd.	5	5	0
E. Sayers	2	2	0
N. S. Norway	2	2	0
Llewellyn Ryland, Ltd.	2	2	0
K. Preston	1	1	0
F. P. Searight	1	1	0
F. Rogerson	1	1	0
M. Melhuish	1	1	0

Further contributions to the fund (which is to provide for the children of the late Mr. C. H. Lowe-Wylde, the ultra-light-aircraft pioneer) are still urgently required, and should be sent to Mr. E. C. Gordon-England at the London Air Park, Feltham, Middlesex.



UBIQUITOUS: What are commonly but not very descriptively termed "plastics" are being increasingly widely used in aeronautical work. The photograph above shows elevator and rudder control pulleys moulded from special shock-resisting Bakelite by the Lorival Manufacturing Co. (1921), Ltd. On the right are two instrument panels machined from "Trefoil" Bakelite laminated sheet. This is a fabric-based material which will stand a great deal of hard usage. Bakelite is manufactured by Bakelite Ltd., 68, Victoria Street, London, S.W.1.

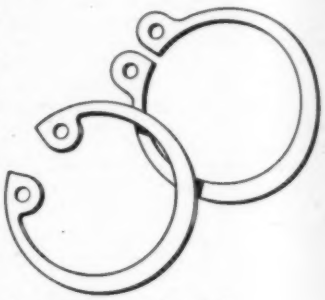
HERE an

Roofs, Thatched and Otherwise: A Comp

A Big Roofing Contract

PROTECTED metal is becoming more and more popular for factory roofs where strength and permanence without upkeep cost are important considerations. One of the largest contracts has been carried out in Cellactite, the steel-cored corrugated sheeting, which has been used both for roofing and vertical cover, on industrial buildings covering a floor area of approximately ten acres in Nottingham. That the sheeting area is 315,000 sq. ft., with 3¼ miles' run of Cellactite ridging and flashing, gives some idea of the magnitude of the job, which has just been completed (including the stripping of old material, to say nothing of extensive glazing), in the short time of 4½ months, by Cellactite and British Uralite, Ltd., Lincoln House, High Holborn, London, W.C.1. This firm has carried out a number of contracts for the aircraft industry.

SCIENTIFIC CIRCLIPS: Designed as an improvement on the old wire circlip, accurately made, and with a correctly variable cross section, the Seeger circlip exerts a constant pressure round the whole of its circumference. It is made in "inside" and "outside" patterns as shown here, and in some fifty different sizes, by the Automotive Engineering Co., Ltd., The Green, Twickenham, Middlesex.



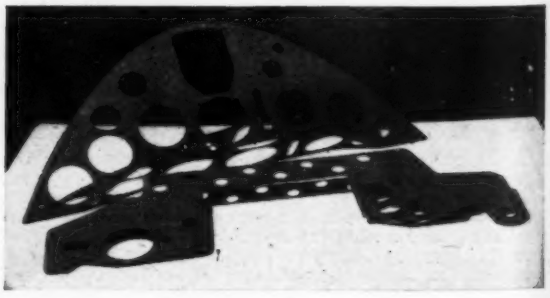
An Outstanding Technical Work

Airplane Design (Performance), by Edward P. Warner, A.B., M.S. McGraw-Hill Publishing Co., Ltd., Aldwych House, London W.C.2. Price 36s. net.

AVIATION literature is growing at such a pace that one might be forgiven for thinking that there is no real need for yet another text-book on the aerodynamics of aircraft design. Superficially one would be right; the student already has available a wealth of books from which to choose his introduction to the fascinating study of aerodynamic design. Actually, one would be quite wrong, as this new book by Mr. Warner proves. It is a good book; a very good book indeed. Like all good things, it may *appear* expensive (at 36s.), but, like some good things, it isn't. Mr. Warner has the gift of making himself understood, and although *Performance* is fairly advanced, the author conducts his reader to the difficult bits by such easy stages, and illuminates his arguments with such easily followed explanations, that any serious student should have no difficulty in gradually mastering even the more intricate passages.

Although *Performance* is the second edition of Warner's earlier book *Aerodynamics*, it is virtually an entirely new work. This is what the author has to say on the subject in his preface:—

> "Nine years ago this summer I published a book on the Aerodynamics of Airplane Design. Nine years is a long time in technology, and nowhere more so than in aeronautical science. The volume that bore the imprint of 1927 has fallen badly out



THERE

Technical Work : 450 h.p. from 8 Litres

of step with the art, and its revision and modernisation have become progressively more important. This is the revision. Or, at least, it was started as a revision. As the work went forward it became apparent that there was so much that needed to be added, and so little that could remain unchanged, that revision gave way to complete rewriting, and that in turn to subdivision. A treatment of the aerodynamics of design adequate for the serious student can no longer be confined within a single pair of covers and not grow too bulky to handle. The subject has been split, and performance alone, and the basic aerodynamic laws and phenomena and collected data which control performance, are treated here. Stability and control will follow in another volume."

Throughout the book there is evident a desire on the part of the author to make his book as suitable for the man who studies at home as for the student who attends classes. This is not the least valuable feature of the book, for it means that young draughtsmen and other workers in aircraft factories can, if they have the will, study the science of aerodynamics in relation to performance calculations in their spare time and thus make themselves more useful to their employers and to themselves.

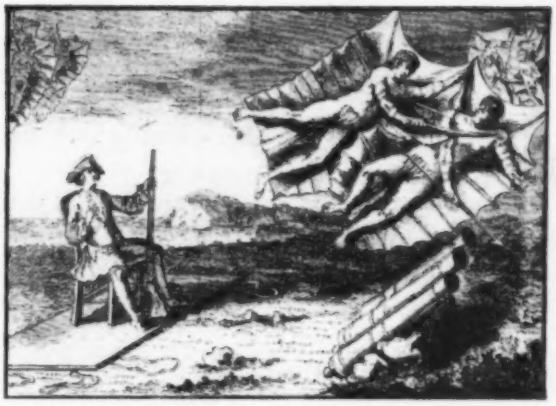
Fundamentals Thoroughly Discussed

Of the 642 pages of the book, the first 446 deal with fundamentals such as 'aerofoil theory, induced and profile drag, parasite drag, and so forth. The rest of the book deals in turn with power plant characteristics, airscrew characteristics, and, finally, with performance curves and their construction.

That the book is thoroughly up-to-date is shown by the fact that boundary layer control and the possibilities of using it for obtaining increased lift and decreased drag are discussed. This is a subject which is only just beginning to be examined seriously by research workers and aircraft designers.

A welcome inclusion in the section on induced drag is a simple explanation of F. W. Lanchester's sweep or momentum theory which, while not so rigorous as the vortex theory and rather incomplete, involves only elementary mechanics.

Performance is so well arranged, so carefully planned and so thoroughly executed that one hesitates to offer even a very mild criticism. Worked-out numerical examples might have been included in many of the chapters. They assist the student to a surprising degree. But probably considerations of space were responsible for their omission. The theory of the Autogiro is *terra incognito* to most students, and its inclusion in the book would have been welcomed by many. It is small consolation to read, on page 4, that "the basic theory has been developed almost exclusively, and is to a large extent held in confidence, by Señor de la Cierva and his associates." Can it be that Mr. Warner distrusts the official publications which *have* appeared on the subject of rotating-wing aircraft? Certainly the scale effect which has been found to exist largely nullifies the conclusions based upon model tests, but one feels entitled to expect some treatment of the theory of the Autogiro in a book of the uniformly high standard of *Performance*.



SURELY THE FIRST visualisation of an anti-aircraft battery, this drawing is from a book published in 1763 and entitled *Les Hommes Volans*. The low-altitude engagement between the two "Gladiators" is equally interesting. The book is one of hundreds of rare and historical works dealt with in considerable detail in a catalogue entitled *The History of Flight* and issued by Maggs Bros. Ltd., 34/35, Conduit Street, London, W.1. The catalogue also contains a section on air mail stamps.

Air France Mail Souvenirs on Show

AIR France are exhibiting an interesting collection of "flown covers" at the Stamp Exhibition which opens at Dorland Hall next Saturday, October 17. The covers, about thirty in number, are contained in two large frames and include envelopes bearing cancellation marks for a number of pioneering flights carried out by the company.

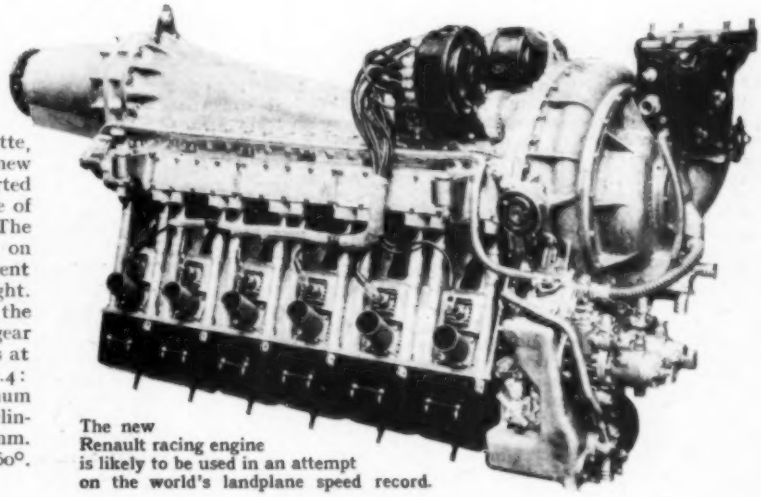
Among the most interesting are the first flight from China to Europe by a regular air mail service, the first all-air mail service across the South Atlantic.

COMPRESSED POWER

The New Renault Inverted Vee-Twelve : 450 h.p. from Eight Litres

IT was intended that, after the Coupe Deutsche Race on September 13 (which event was won by Yves Lacombe, on a Caudron-Renault monoplane of 1934 vintage at an average speed of 233 m.p.h.) an attempt should be made on the world's landplane speed record by Delmotte, the chief Caudron test pilot, using a new low-wing Caudron fitted with an inverted air-cooled twelve-cylinder Renault engine of only 8 litres (488.8 cu. in.) capacity. The weather militated against the attempt on that occasion and Delmotte had to content himself with a short demonstration flight.

A geared and supercharged model, the new engine runs at 4,500 r.p.m., the gear ratio being 2 : 3. The supercharger turns at 28,500 r.p.m.; the compression ratio is 6.4 : 1; the weight 700 lb.; and the maximum cross section about 20½ inches. The cylinders, which have a bore and stroke of 90 mm. and 96.5 mm. respectively, are set at 60°. At ground level 450 h.p. is claimed.



The new Renault racing engine is likely to be used in an attempt on the world's landplane speed record.

Correspondence

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases, accompany letters intended for publication in these columns.

AGE AND AVIATION

TOO old at forty-five! When I applied at the age of 70 for a "B" licence the Air Ministry replied that being over 45 I could not have one. Yet, in the air, age is more reliable than male youth. Female youth is different. Patience is an attribute of femininity as it is of age, and patience implies an equable mind throughout any task the individual undertakes. A very learned *littérateur* has shown that Charlemagne's great paladins, Roland who fought to the death at Roncesvalles and others, were all at their zenith when over the three score and ten. The Germans credit to their Lillienthal the first glider flight and the design to which the American Wrights hitched an I.C. engine, so originating twentieth century aviation. Yet, in 1806, a certain General Résnier flew in a glider for a distance of 300 metres, and, mark, he was then 76. In the year of Jena there was no I.C. engine to give Napoleon world dominion.

A. J. RICHARDSON.

North Walsham, Norfolk.

GROUND SIGNS

WITH reference to the interesting letter in last week's issue under the above heading from the assistant engineer of the Leominster Gas and Coke Company, many gasworks in various parts of the country are now grouped under the control of holding companies, who would, I have no doubt, arrange for a number of holders to be painted with ground signs if they were approached. In the event of war, it would be an easy matter to obliterate the lettering.

This Company has gasholders with the names of the towns on the crown at Hull (Yorks), Holywell, Flint (N. Wales), Baldock (Herts), Trowbridge, Bradford, Warminster (Wilts), and it is intended to do others.

It may not be generally known that the spiral-guided gasholder—the most popular type at the present time—rises and falls with a cork-screw motion and is useless as a direction indicator, but can be used for the name of the town alone.

We have found the cost of painting the name on a medium-sized gasholder to be about £4 10s.

D. B. PARKINSON,
The British Gas Light Company, Ltd.

London, S.W.1.

THE STALLING OF YAWED AND TAPERED WINGS

FROM Mr. Gray's comments in his article in your issue of September 3 it appears that he has difficulty in following some of the arguments in my letter of August 27. It should have been evident that I accepted Mr. Gray's experimental evidence that a transverse flow exists and that the stalling of a section towards which it is directed is, in fact, accelerated. My point was that I did not consider that Mr. Gray had produced a satisfactory explanation of the above facts which I believe to be difficult of explanation, and I am far from claiming my own explanation to be a complete one. I hope that the following modified form of my original argument may be less open to misunderstanding.

Imagine, to be definite, a finite rectangular aerofoil at rest at zero yaw in a uniform stream. Now suppose that the aerofoil is suddenly given a uniform velocity parallel to its span; then initially the air flow will be entirely undisturbed (except close to the ends) and so there will be initially an additional transverse velocity *relative to the aerofoil* which will be the same everywhere, being equal to the transverse velocity given to the aerofoil. If this transverse velocity is small in comparison to the velocity of the original stream the resulting change in direction relative to the aerofoil will be everywhere small, except in regions where the original air velocity was small, such as the air close to the upper surface of the trailing edge. Immediately after the impulsive start the flow will begin to settle down to a new state of steady motion in which the transverse component velocity relative to the aerofoil will be everywhere reduced by viscosity below its value at a distance, but may be still great enough to correspond to a considerable inclination towards the downstream wing tip at points just above the trailing edge. At points near the leading edge the thickness of slow moving air capable of being deflected will be much smaller but the effect will be in the same direction as near the trailing edge.

Now consider the effect on the "pitot boundary," i.e., the boundary at which the total pressure head of the air becomes equal to that of the undisturbed stream. The transverse velocity component will tend to remove some of the slow moving air from the region inside the pitot boundary near the upstream wing tip; this will bring the boundary closer to the surface of the aerofoil and retard the stall. The opposite effect will be produced near the downstream wing tip.

It is desirable to emphasise that the above transverse velocities will be additional to those associated with the ordinary Prandtl trailing vortices. In this connection Mr. Gray suggests that I imply that the ordinary Prandtl theory of a monoplane wing only holds good if the trailing edge is straight. My actual statement was that the aerofoil with straight trailing edge "would be expected to behave more nearly in accordance with the ordinary Prandtl theory of a monoplane wing, on the assumption that all sections have the same maximum lift coefficient." Actually the Prandtl theory as such applies only below the stall. It cannot therefore determine whether wing tip or root stall first except by use of such an additional assumption as that all sections stall at the same local incidence (same CL). My suggestion, in common with what I understand to be Mr. Gray's theory, is that it is only with a straight trailing edge that all sections stall at the same local incidence, and we are both trying to account for the experimental result that, with, say, a swept back trailing edge, the centre stalls at a higher local incidence than the tip, the distribution of incidence and lift being as determined by the Prandtl theory.

C. N. H. LOCK.

Hampton Hill, Middlesex.

POP RIVETING

ON his return from a somewhat protracted absence the writer has read a letter appearing in your issue of September 3, in which Mr. S. T. Johnson, of Aviation Developments, Ltd., contradicts our statement that pop rivets can be set at the rate of 1,200 per hour.

We are not, ourselves, a firm which inserts rivets, but a firm that makes rivets. We have referred this point on riveting to aircraft firms who use our rivets and mandrels and have been reassured that the speed given in our letter appearing in your issue of August 27 is, in fact, an under-statement of the speeds being attained by boys in their employment. We have permission to communicate the name of one firm to Mr. Johnson if he wishes to obtain direct proof.

With regard to Mr. Johnson's statement that pop riveting is more costly than Chobert riveting, we have obtained figures from some of the firms using our rivets and find that the cost of pop riveting steel structures is in many cases under ten shillings per thousand rivets. This sum covers:—

(1) The supply of rivets and mandrels.
(2) The threading of rivets on mandrels.
(3) The inserting of mandrel in tool.
(4) The inserting and fixing of rivets.
(5) An allowance for the tool cost.

Will Mr. Johnson be equally frank and publish the corresponding costs of riveting by the Chobert process?

These points of speed and cost are the only ones on which Mr. Johnson challenges the statements made in our letter in your issue of August 27, and we would point out that this letter dealt mainly with the quality and reliability of pop riveting compared with other riveting systems.

GEO. TUCKER EYELET CO., LTD.,
R. Ruddock, Director.

Birmingham.

Returning to the Fold

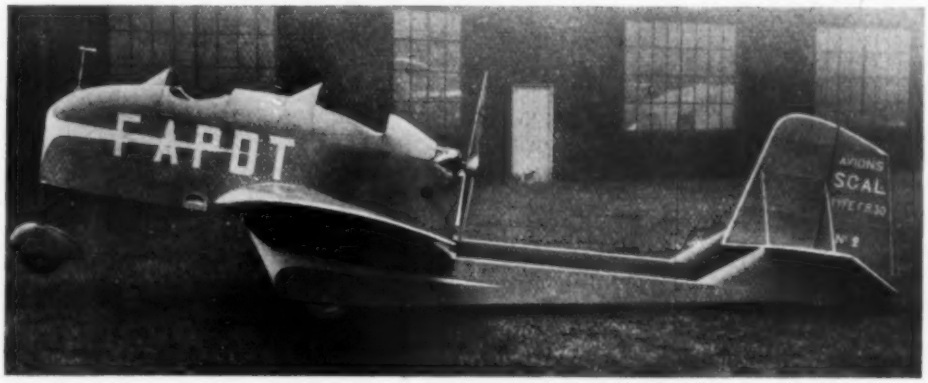
TWO of aviation's old-timers are about to return after an absence of some years. Older *Flight* readers will probably remember the Garuda propeller of about 1913. Connected with that, and with the Albatros Company, was Mr. Jablonski, who came over with Robert Thelen in an Albatros in 1914 and gave demonstrations at Farnborough and elsewhere. Mr. Jablonski has now secured the British rights in the well-known German Heine propeller, and a company is being formed in this country to manufacture it, probably at Ipswich. Associated with Mr. Jablonski is another old-timer, Harry Delacombe, whose work in the earliest days of flying is still well remembered and who afterwards served valuably in the R.N.A.S.

NAVIGATIONAL ERRORS EXCEPTED: An extremely modern signpost at Karachi—though hardly a helpful one for pilots passing through non-stop.

"O.K. FOR LIGHTS" was the order in this anti-aircraft control room, but the lights were studio ones, and the shooting was confined to the air-defence film "The Gap," which Gaumont-British are making with official co-operation.

MILESTONES and MOVIES: Odd News in the Camera's Eye

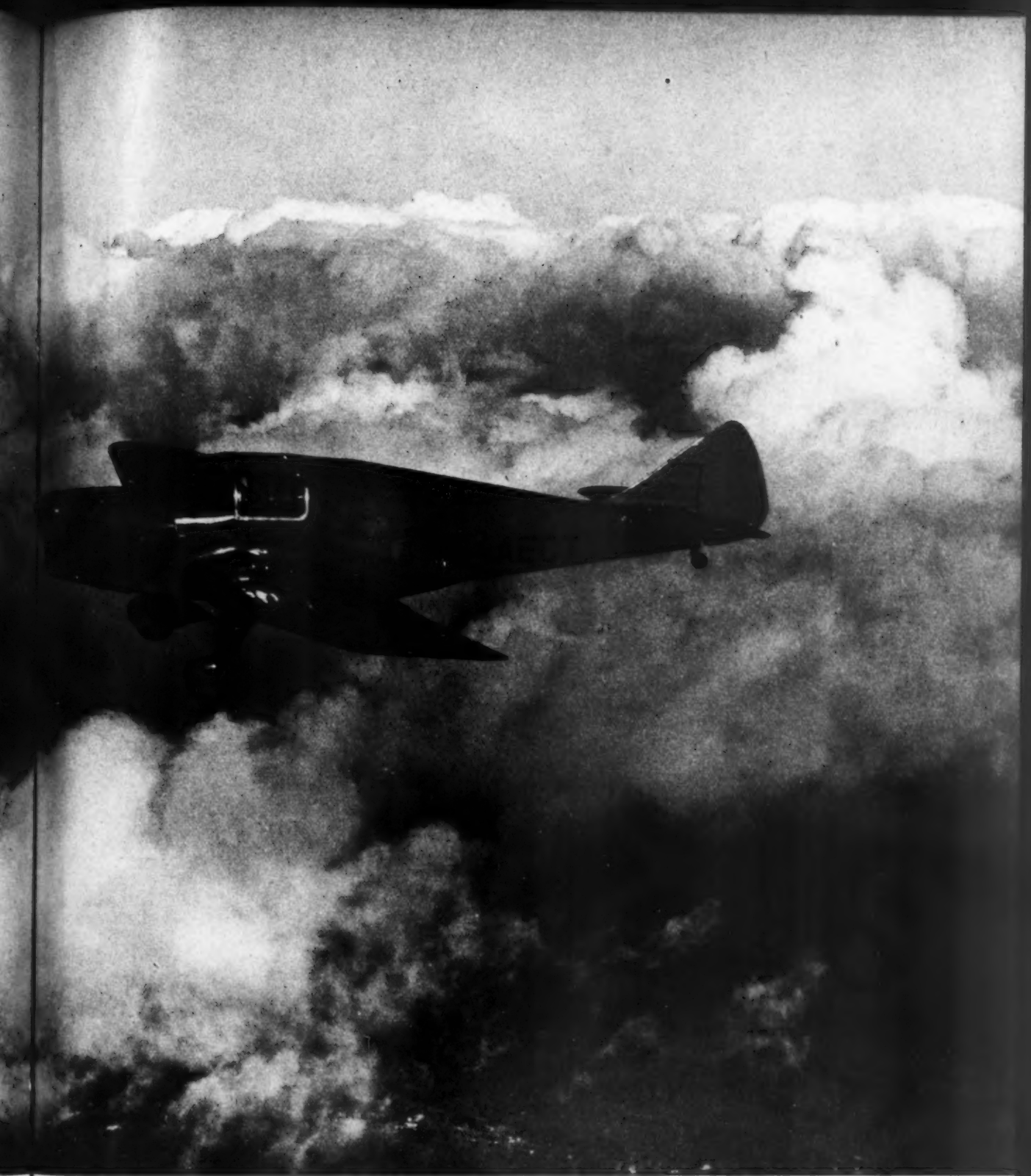
PRAYING MANTIS: A new angle on the unorthodox yet oddly attractive-looking Bassou pusher, which, as related in *Flight* of September 24, has been imported with a view to manufacture in this country. The engine is a 32 h.p. Mengin flat twin.



(Left) SANCTUM SANCTORUM: Presumably useful in time of peace as a retreat for salesman-harassed departmental heads, this gas-proof shelter for ten people has been installed at the London offices of the Carrier Engineering Co. It has an air filtration plant, radio, and ration and first-aid equipment. (Below) SPITFIRE AND BATTLE in miniature interest two visitors to the R.A.F. stand at the Model Engineer Exhibition.

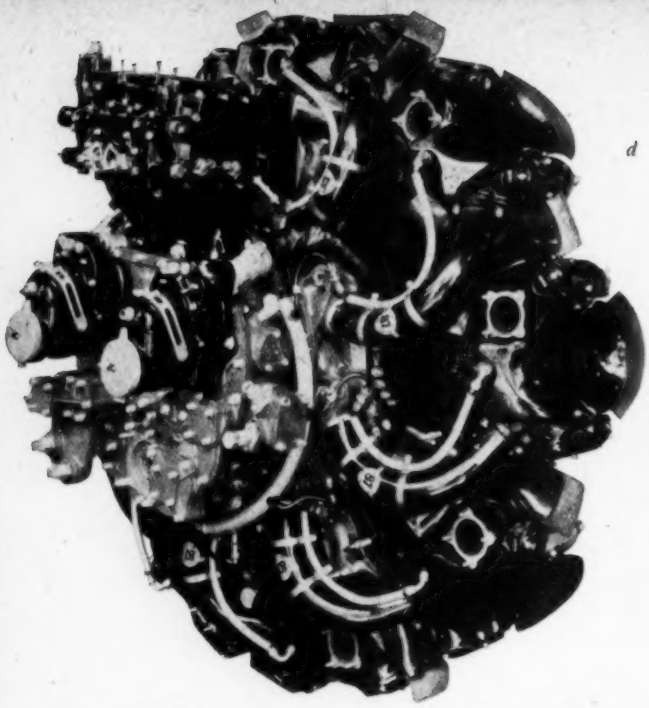
AIRCRAFT MILITANT and PACIFIC

Some Studies of Bombers on Parade and a Sociable Coupé

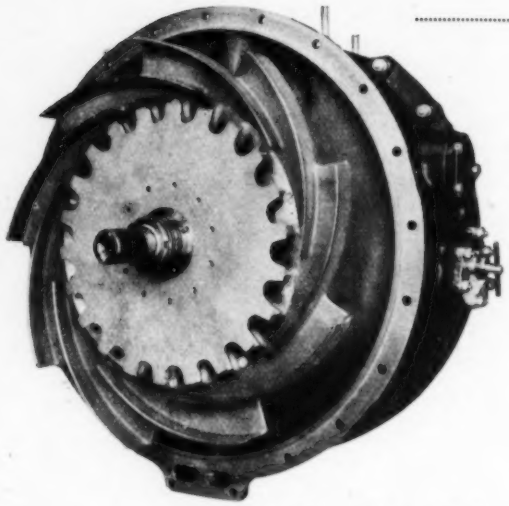


(Above) Sailing along tranquilly at a comfortable " twenty-one hundred," with the A.S.I. telling of progress of well over two miles a minute, the appealing little Miles Whitney Straight side-by-side two-seater, out for an airing over Reading, presents an attractive subject for *Flight*'s photographer. Such surroundings carry the mind from things mundane and mercenary, but for those who want to know—and it seems there are many—the price is £985.

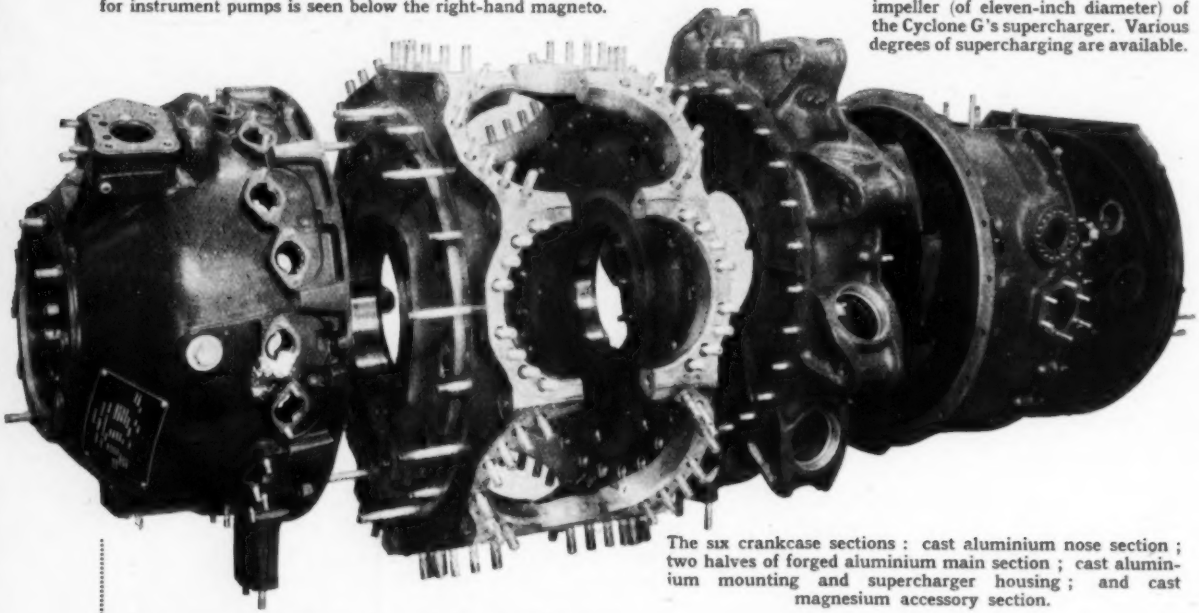
(Left) Medium bombers are the talk of the day in Service circles (the Ministry has on order the Battle, Wellesley, Blenheim, H.P.52 and Wellington), but what experience the R.A.F. has had in the operation of this class of machine has been provided by the trusty Boulton Pauls of No. 101 (Bomber) Squadron, a flight of whose Pegasus-powered Overstrands is seen exercising at some thousands of feet.



Showing the accessories and close-fitting baffles. A drive for instrument pumps is seen below the right-hand magneto.



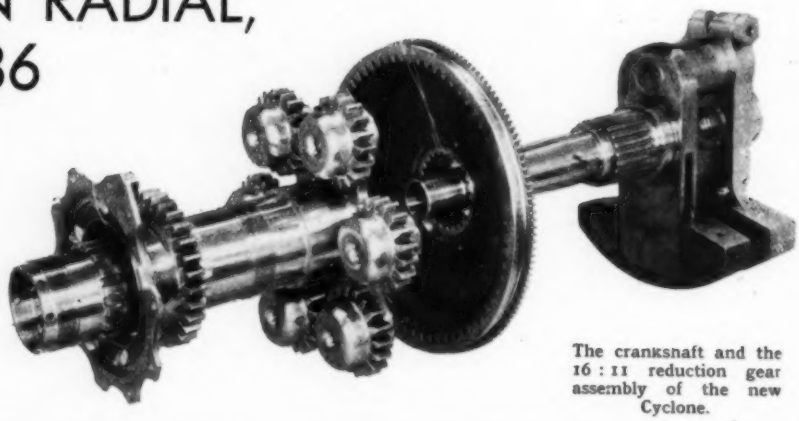
The vaned diffuser plate and the impeller (of eleven-inch diameter) of the Cyclone G's supercharger. Various degrees of supercharging are available.



The six crankcase sections : cast aluminium nose section ; two halves of forged aluminium main section ; cast aluminium mounting and supercharger housing ; and cast magnesium accessory section.

AMERICAN RADIAL, 1936

Some Features of the New "G" Series Wright Cyclone, Which Gives 1,000 *h.p. for Take-off*



The crankshaft and the 16 : 11 reduction gear assembly of the new Cyclone.

Private Flying

Topics of the Day

Just an Aeroplane

WHENEVER I have made an inspection of, or flown in, something particularly large in the way of transport machines or flying-boats I am always shocked by the sudden realisation that it is, after all, only n aeroplane. Bathrooms, kitchens, half a dozen engines, adio and automatic pilot notwithstanding, this magnificent iant will stall and spin like any light aeroplane, and must, ltimately, be *balanced* by a single human being.

At such moments I wonder whether we are too ambitious nd are learning to run even before we have learnt to crawl. With all the tangle of comfortable devices a transport eroplane is still the same unstable and unreasonable conraption which was forced into the air for a short hop by he brothers Wright.

I wonder, too, whether we should not be better off if .e human race grounded every aeroplane in the world id started again. Such a start would be made with all ur aeronautical experience behind us, but with such basic ules as would be necessary to ensure safety-first develop-ent. A minimum forward speed of not more than 10 .p.h.; a gliding or approach angle which could be varied om 1 in 2 upwards; an undercarriage which would take shock equal to that applied by a machine descending ertically at 20 m.p.h.; and so on.

The first example to be produced might have a maximum peed of 70 m.p.h., but the demand for higher speeds and wer fuel consumptions would soon provide results.

The Real Conservatives

NEEDLESS to say, almost every living test pilot and engineer would fight tooth and nail against such a ecree. The stipulations would be called absurd and there would be a lot of nonsense talked about the "right to ake risks" and about "molly-coddling the race." There would be no lack of danger in the business of testing any ew idea which might conceivably help to solve the problem of providing a real speed range, and as for "molly-coddling"—any reasonable person who examines the in-surance rates for civil types might well wonder that any flying is done at all save by military and transport pilots.

Why should an aeroplane be landed at the stall and be parked in such a way that any puff of wind can send it flying again? Why should three-pointers be made? Why should a machine need to run three or four hundred yards and gain a ground speed of 60 or 70 m.p.h. before it can stagger into the air with a disgracefully poor climb?

Everybody has got into such a mental rut about aeroplanes that the biggest machines in the world are just overgrown trainers—with most of the faults of a 1909 Bleriot slurred over by an almost unlimited supply of horse-power.

When we have scraped away the mud that has been flung at the U.S. Bureau of Air Commerce we find people who, with all their possible faults, have at least tried to develop something which is not a flying coffin for the use of professional tight-rope walkers.

Not that I am complaining. At considerable cost, in cash and effort, I have learnt to be tolerably safe in an aeroplane, and I should hate to think that this cost had been altogether wasted. Probably it hasn't. When someone produces a real flying machine I shall be better able to appreciate it, and shall try not to be jealous of the new generation, for whom the job of learning to fly is little more than that of memorising the position and use of a few controls. In the meantime, I enjoy the exercise of particular and quite unnecessary kinds of manual, pedal and ocular dexterity.

Transport Technique

AT one time or another various people have criticised certain features of the "B" licence testing routine, and, in particular, have complained of the fact that the practical flying tests are carried out under the eye of a Service instructor at a Service aerodrome and with a semi-Service type. Actually, I do not think there is any doubt that the Service or ex-Service pilot knows more about the art of flying, *per se*, than any other, and that the transport pilot knows more about the science of flying.

At Hendon the earnest aspirant is being tested purely as a pilot, and the only absurd feature concerns the facts that he is flying a machine which he may never see again and that the art of flying a big commercial type does not in any way resemble that of flying a Tiger Moth.

The question is not whether Service instructors should do the testing but whether this testing is necessary. I should say that it is, but that tests should also be carried out by experienced transport "instructors" in a twin-engined type. Anyone who has taken dual on a biggish multi-engined machine will know that his entire flying technique must be modified in certain essential particulars. The silliest feature of the "B" routine is that spins must be done at Croydon.

However, in the course of a few months we shall probably see some very considerable changes in this "B" licence business. The present night-flying test, for instance, is by no means adequate, and it is, in many ways, easier to fly blind under the hood of an open machine than in the cabin of something big with a row of engines—though the second type is usually more stable. The transport "B" of the future will probably involve study and practical experience rather more on the lines of that obtained by the Imperial Airways' probationary first officer during his "schooling." These young men fly, so to speak, with a slide-rule in their throttle hands, and spend their time giving "estimated time of arrivals" and other important information. Merely to arrive is considered to be an unsatisfactory result of a little aviation. INDICATOR.

Private Flying

FROM the CLUBS

Events and Activity at the Clubs and Schools

NOTTINGHAM

TWENTY-EIGHT hours, fifteen minutes' flying was recorded during the week ending October 8. Mrs. M. C. Hoffen has become an associate member, while Dr. Travers and Mr. W. P. Hutchinson are flying members.

REDHILL

For the week ending October 9 flying times totalled 69 hr. 10 min. Mr. J. Barkel went solo, while Messrs. M. Illingworth, Boyse and Mayhew passed their "A" licence tests. There are two new members.

C.A.S.C.

On Sunday members flew 15 hr. 30 min. Two members flew to Le Touquet for lunch. Mr. J. C. Wade, ex-R.A.F., who has not flown since the war, has joined the Corps, together with Mr. G. Usher, who has his licence to fly Autogiros.

PORTSMOUTH

Unfavourable weather kept flying time down to 28 hr. 50 min. during the week ending October 9. New members were Mr. H. E. Harding and Flt. Lt. J. G. Elton. The first of the monthly dances was held on Wednesday, October 7.

BRISTOL

The Bristol and Wessex Aeroplane Club flew 25 hr. 55 min. last week. Miss H. Pitman and Miss B. Brown went solo, and Messrs. H. Rivers Pollock and E. G. Lacey became members. Messrs. M. H. Taylor and R. A. Barnwell completed their "A" licence tests. Mr. Slade, the chief instructor, is going on leave from October 16 to 23.

SOUTH COAST

Over forty hours' flying was done during the first week of wintertime. Next Sunday there will be an arrival competition for lunch, there being two sealed times between 12.15 and 12.45. The pilot and one passenger of the two machines landing nearest these times will be given a champagne lunch at the airport.

A.S.T.

The new term starting in September has seen many changes among the students at Hamble. Seventeen new ones commenced the three years' commercial course and the two years' ground engineers' course, many of them coming from distant parts, including Canada, India, Jamaica, Jugoslavia, France, Holland, and Egypt. Mr. Lubbock joined for a vacational ground engineer's course and Mr. Davidson for the "A" licence. Lt. Maculan of Austria, Mr. Chen of Java, Mr. Thomas of Australia, and Mr. Perkin, left on completion of their training, while Mr. Ismail of Afghanistan has proceeded to India on leave. During the month, Mr. Hamdi, an Egyptian Government official, took a British "A" licence, Mr. Nylund of Finland and Mr. Whincop obtained their "B" licences, Mr. Haddon a blind-flying certificate, and Mr. Naralkar, of India, the P.M.G.'s W/T air operator's licence. Still another type of aircraft has been added to the fleet at Hamble, a Tiger Moth having been recently delivered. Further expansion is to be made in the accommodation and a new instructional rigging shop as well as a new administrative block are to be erected. An increased amount of seaplane training was noticeable during September. The 1,056 hours flown during the month were less than usual owing to a fortnight's break between R.A.F. *ab initio* courses.

CAMBRIDGE

Marshall's Flying School logged 66 hr. 45 min. during the week ending October 11. New members were Messrs. Anderson, Passy, Mitchell, Danby, Symington and Tuffill; "A" licences were obtained by Messrs. Humphreys, Nabih, Cartwright and Salisbury. Mr. Parkhouse did some blind-flying in G-ABOY. The Puss Moth and one of the School Moths went to Le Touquet on Sunday morning and returned the same evening.

BROOKLANDS

Despite bad weather and poor visibility, the weekly total should be around the 95-hour mark. Capt. Davis flew his Scott-powered D.H. 53 successfully at the first attempt. The out-of-bounds area is fast disappearing; pilots are relieved to find the patch contracting almost daily. New members are Messrs. A. D. Whitworth, J. Lydall, Blundell and Reynolds; first-soloists are Messrs. C. W. Roberts, Crouchley and Squire; and the height test has been passed by Messrs. Crockatt and Pieterse.

LEICESTERSHIRE

The Club's financial year ended on September 30. The total "paid" flying hours for the year 1935-36 amounted to 1,084, as against the previous best aggregate in 1932-33 of 1,057 hr. 50 min.; the total all-in flying times for 1935-36 was 1,116 hr. 50 min. A pilot member of the Club, Mr. L. T. Lillingston, has bought a new B.A. Eagle. Messrs. W. A. Sheppard, J. S. Loweth, F. J. R. Carver and P/O. F. E. Rosier have become pilot members. The total flying time for September was 83 hr. 20 min. Mr. A. L. Wyles took his "A" licence.

CINQUE PORTS

Several distinguished people visited the airport last week, including the Duke of Kent, who arrived by air to inspect the Royal West Kent Regiment at Shorncliffe, Miss Jean Batten, who started her New Zealand flight from Lympne, and Mrs. Mollison, who came in from abroad flying a Dragon. New members include Messrs. Brian Allen and H. M. Nunes. Last week's flying time was 64 hours. Messrs. S. Steyne, Heinz Freidrich and C. Cameron passed their "A" licence tests, while Messrs. A. J. Green, C. Chalmers and L. C. Hilditch have completed their long "B" licence cross-country flights. Now that the weather is getting colder—especially at 7,000 ft.—the Leopard and Puss are becoming increasingly popular for this work.

HERTS AND ESSEX

Three Moths and the Stinson Junior went to Portsmouth for the start of the Johannesburg Race. For the week ending October 2 flying time was 79 hr. 49 min., and for last week the figure was 85 hr. 13 min. There were eleven entrants in the cross-country competition for the Shelmerdine Challenge Bowl; Mr. L. B. R. Pyle was the winner, with Messrs. D. C. Mason and A. R. Saward second and third respectively. First solos have been made by Miss G. Baker, Mr. R. Thierry, and Comte H. du Berrier. New members are Mrs. A. M. Daly and Messrs. G. H. Hutton, F. D. Scott, E. A. Hayes, W. W. Lawrence, D. R. G. McGregor, R. A. B. Wolff-Salin, R. Thierry, A. W. Seddon Holmes, and E. A. Lofberg. Mr. A. Harris has returned to the Club and is assisting with instruction. The total flying time for September was 332 hr. 42 min.

POWER FROM BROUGH. The V.E.F.J.-11, a light Latvian private-owner type built round one of the new Cirrus Minor engines. The speed figures quoted are 124 m.p.h. cruising and 149 m.p.h. maximum, which, for 90 h.p. and two up is good going in any language. The mounting of the tail plane is one outlandish feature to note. It appears that the occupant of the front seat has quite an extraordinarily good prospect.

HULL
The total flying time for September was 126 hr. 15 min. Mr. D. Strachan went solo.

NORFOLK AND NORWICH
Over twenty-five hours' flying was logged last week. Mr. J. Simon became a pupil.

HANWORTH
Last week's first-soloists were Messrs. Bull (Air League), Bingen and Senenayeke. The flying time was 46 hours. Mr. Tom Flack became a member. Mr. John Kirwan is taking instruction with a view to becoming an instructor himself.

KENT
New members last week were Mrs. McWatt and Messrs. Duvall, Parkin, Underwood and Walker. Messrs. Leaman, Rundle and Parkin made first solos—the last two within an hour of each other—and an "A" licence was obtained by Mr. Harvie.

MIDLAND
For the week ending October 9 flying times at Castle Bromwich were 11 hr. 10 min. dual and 11 hr. 5 min. solo and passenger. Mr. K. H. Ledbrook became a flying member and Miss M. Johns and Mr. W. G. Parsons joined as ordinary members.

WITNEY AND OXFORD
Fifty-two hours' flying were logged during September. Mr. V. A. Dawson, who reported for the instructor's course, has duly obtained his certificate. Messrs. R. G. Secretan and G. R. Beale-Browne passed their "A" licence tests, and Mr. A. O. Cundy renewed his "A" licence.

LONDON
The London Aeroplane Club will be holding its annual dinner and dance at the Park Lane Hotel on December 18. Last week's flying times totalled 110 hr. 5 min. Messrs. F. Thomas and Mrs. Clayton went solo, while Messrs. H. Deen, M. G. L. Foster and T. W. Burton completed their "A" licence tests.

YAPTON
Flying times for October to the 10th amounted to 30 hr. 25 min. Mr. R. G. Marsden and Capt. Hugh Clement-Davies became members, the latter to take a "B" licence course. Mr. L. E. Clark took his new Gull to the Club on Saturday for a farewell visit before leaving for New Zealand. He must hurry home for the sheep shearing.

R.A.F.
There has been a steady demand for Club machines during the past few weeks in spite of little encouragement from the weather. The date of the annual ball at Grosvenor House has been fixed for December 3. The following have become members:—Group Capt. W. H. Primrose, Flt. Lt. G. D. Harvey, Flt. Lt. J. Parry, F/O. W. R. P. K. Mason, F/O. L. M. Beavis, P/O. S. E. F. Curry, and Mr. J. W. Schofield.

YORKSHIRE
Club aircraft flew 55 hr. 5 min. last week. Mr. T. Fox joined the Aviation Group and Mr. G. F. D. Walker and Dr. E. S. Bolton went solo. Dr. Bolton also passed his "A" licence tests, as did Mr. G. Vivian, an Aviation Group member. On November 1 a cinema show will be held in the clubhouse; there will be the usual bonfire, firework display and hot supper on November 5; and on November 20 the Club will hold its annual ball at the Grand Hotel, Harrogate.

LEEMING AND YORK
Flying times for September at Leeming and York totalled 233 hr. 11 min., and for the week ending October 10 at York, 58 hr. 30 min. Messrs. Dossor, Baird, Handley, Hardcastle, Barnett, J. and C. Stubbs passed their "A" licence tests and Dr. Milligan went solo. The Club was glad to see the Western brothers at York with their Cirrus-Swallow. New members are Messrs. Rowntree, Hunt, Baird, Fairbank, Beaumont and Evans. Yorkshire Aviation Services have taken delivery of their Hillson Praga.

Not in Vain

It is not often that it is possible to point a moral from the results of an accident enquiry. Last week, at an inquest on the pilot of a light aeroplane, it was suggested by the inspector of accidents that the passenger had unwittingly delayed recovery from a spin by applying pressure on a dual rudder-bar which had not been disconnected.

Everyone who can remember his feelings even as a pilot during a first instructional spin will understand the essential reasonableness of such a theory. Let us hope that more care will be exercised in future by all and sundry, so that one pilot may not have died in vain.

Noughts and Crosses

THE Gwynn Madocks Cup was won by Capt. A. S. P. Murray on October 7 in conditions of unusual severity. This cup, presented by the parents of the late Lt. Gwynn Madocks, is competed for in an annual landing competition by serving members of the Household Brigade Flying Club. Separate cups are competed for by non-serving and lady members.

In previous years the event has been run on the conventional system of landing and coming to a standstill in or near the circle in the middle of the aerodrome. This year it was decided to brighten matters up, and a ladder formation of tape, garnished with flags of different colours, was laid out. Each competitor made two landings. The luckless pilot was required to touch down beyond the base line and come to a standstill as near to it as possible. He got fifty marks for touching down within fifty yards of the base (*i.e.*, in the circle), and a diminishing remainder of marks for finishing up in one of the four ten-yard sectors beyond the circle. The further ten-yard sectors ran from nought to minus fifty. So to gain a plus score he had to touch down within the circle and come to a standstill not more than 140 yards from the base line.

Until late in the afternoon the leading score was a "duck" and most of the remainder were minus. Capt. Murray, who won the cup, and Mr. R. Somerset, who won the non-serving members' cup, each scored twenty. Miss Mary Warner (the previous holder) won the ladies' cup with nought.

The Entertaining Mr. Chichester

Ride on the Wind, by Francis Chichester. Hamish Hamilton, 10s. 6d.

HAVING read Mr. Chichester's *Seaplane Solo* and *Solo to Sydney*, we opened his latest book eagerly, and were not disappointed. Again he is flying his veteran Moth-on-floats, and this time it takes him—mostly at ten feet or so above the water—from Sydney, along the Great Barrier reef, to the Philippines *via* New Guinea, thence to Formosa and Shanghai, and finally to Katsura, in Japan. His ultimate goal was England, but in taking off from Katsura he hit a cable stretched high above the harbour, completely writing off the trusty little Moth. Much of the book was written during his period of convalescence following the accident; other parts of it are notes actually penned in the cockpit.

Mr. Chichester shows a unique disregard for danger, coupled with acute sensibility. He is perfectly happy whether squatting on a float a hundred miles from land throwing tit-bits to the sharks or flying blind through mountain valleys, munching "fermented sandwich and petrol biscuit."

And his humour is altogether delightful, as instance a conversation at Shanghai:—

"I said to one of the petrol men, 'Isn't this the place that Ulysses had such difficulty in passing, because of the sirens?'

"'No,' he said, 'I don't think he passed here; if he did, he wasn't using our petrol.'"

Heston Swan-song

THIS is the season of yawns at Heston. Those whose duty it has been through the summer to walk, trot or run for the benefit of British Aviation, now stand, sit or lie and gaze disconsolately on fog and rain, cursing the weather.

On such a day as this (says *Heston Flying News*) recently there approached from the south two shadowy, air-borne shapes, bent on defying all known QBI regulations. Lookout, after close inspection, discovered that they were intrepid swans, heading for the frozen north with graceful, outstretched necks and powerful beat of wings.

This little episode has given birth to a revolutionary idea worthy, we consider, of all those other great inventors who submit their products to the hard world of science and Big Business, and, we fear, destined like theirs to rot in oblivion.

Briefly, we asked ourselves what enabled a mere swan to continue flying low through impossible weather, make straight for the Heston gasometer, evade it, adjust his directional gyro, and pass on. Clearly the principle is based on the fact that his eyes are placed several feet in advance of his body, mounted on a retractable neck. When faced with an obstruction he immediately retracts his neck, at the same time communicating the necessary flick to his tail which sends him up in a steep climb to safety. Alternatively, his neck being, as it were, independently sprung, a little right or left twist would soon indicate a clear passage and eliminate the necessity for complete retraction.

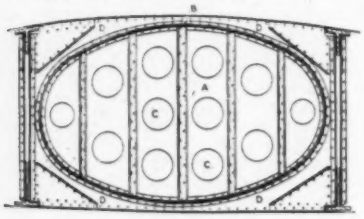
The application of this principle to aeronautical design . . . but need we say more?

The TREND of INVENTION

Recent Aeronautical Patents Reviewed

TANKS for the storage of fuel are often provided within a box form of construction of the spar, and in order to prevent undue surging of the liquid, a series of transverse baffles is usually fitted. A form of construction is described in this patent, in which these baffles not only restrict the movement of the liquid but are also used as stress members in the spar.

As will be seen from the illustration, which shows a partial cross section of the wing and tank, the baffle A and tank B are of elliptical cross section. The baffles have a series of holes C, allowing the liquid to flow from one compartment to another but restricting any excessive surging.



Combined box spar stiffener and fuel tank baffle (Short Bros.)

In the same plane as the baffles are webs D which on their outer periphery are riveted to the spar and to the upper and lower booms. On their inner edges they are attached to the skin of the container B, to which the baffles A are also attached.—*Patent No. 451241: Short Brothers (Rochester and Bedford) Ltd., and A. Gouge.*

◇ ◇ ◇

A METHOD of launching flying boats at sea is described in this patent. A closable dock is arranged at one end of a boat and into this the aircraft can be floated from the sea. The gates are then closed and the catapult which is mounted on the boat is retrimmed to the required angle for launching; at the same time water is let out of the dock so that the aircraft will engage with the launching truck. Ballast tanks are used for adjusting the trim of the boat.—*Patent No. 450265: P. Salmon.*

◇ ◇ ◇

A METHOD of attachment of a folding wing to a stub wing which is fixed to the fuselage is described, and has advantages over the method described in an earlier patent (No. 239971). In the present construction no outside structure to support the wing from the fuselage is called for, and the hinge mechanism is housed completely within the wings, and therefore offers no obstruction during flight. The necessity of having to hinge a separate section of each wing aft of the hinging point is also avoided. The wings are brought back so that they occupy a position close to the fuselage, and at the same time they are tilted so that the chord of the wing is inclined downwards.—*Patent No. 447577: Blackburn Aeroplane and Motor Co., Ltd., and F. A. Bumpus.*

◇ ◇ ◇ ◇

FOR this patent it is claimed that the method of attachment of fabric to frame structures not only prevents any damage to the warp and weft threads of the fabric but also leaves a smooth flush finish. In the web of the frame structures (as, for example, the rib boom), a series of longitudinal grooves are made in line with each other, with a hole pierced through the web at each end. Between the grooves is a bridge portion flush with the outer surface of the structure. The fabric is pressed in the grooves and a wire skewer is threaded under the bridge portion, through the holes and over the fabric in the grooves. An adhesive strip over the depressed portions of the fabric and the wire skewer is fitted, thus producing a smooth finish.—*Patent No. 450083: Short Bros. (Rochester and Bedford) Ltd., and A. W. S. Clarke.*

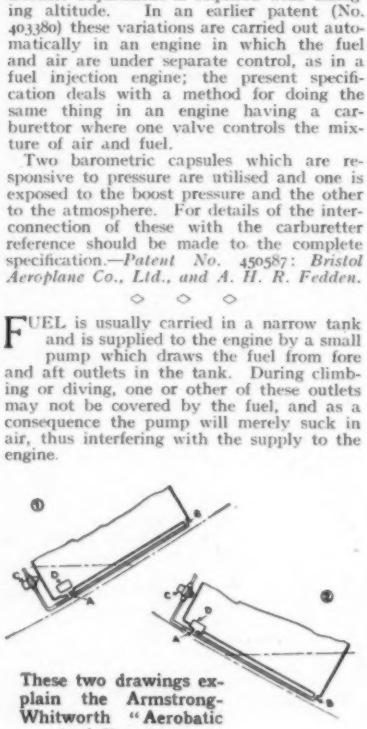
IN a supercharged aircraft engine it is found desirable to vary the proportion of fuel to air as the boost pressure varies, increase of boost pressure requiring a higher fuel to air ratio.

Further, in addition to this variation, another adjustment is required with changing altitude. In an earlier patent (No. 403380) these variations are carried out automatically in an engine in which the fuel and air are under separate control, as in a fuel injection engine; the present specification deals with a method for doing the same thing in an engine having a carburettor where one valve controls the mixture of air and fuel.

Two barometric capsules which are responsive to pressure are utilised and one is exposed to the boost pressure and the other to the atmosphere. For details of the interconnection of these with the carburetter reference should be made to the complete specification.—*Patent No. 450587: Bristol Aeroplane Co., Ltd., and A. H. R. Fedden.*

◇ ◇ ◇

FUEL is usually carried in a narrow tank and is supplied to the engine by a small pump which draws the fuel from fore and aft outlets in the tank. During climbing or diving, one or other of these outlets may not be covered by the fuel, and as a consequence the pump will merely suck in air, thus interfering with the supply to the engine.

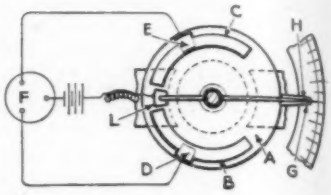


These two drawings explain the Armstrong-Whitworth "Aerobatic tank" patent.

A system is described which obviates this difficulty. The outlets to the tank are shown at A and B and the fuel pump at C. When diving, as shown in Fig. 1, there is sufficient head of fuel in the pipe running beneath the tank to prevent air getting to the pump, although outlet B is uncovered. When climbing, as shown in Fig. 2, air would enter at A and reach the pump. This is prevented by a float valve D which effectively closes the opening A under these conditions. A detailed description of the valve D is given in the specification.—*Patent No. 450784: Sir W. G. Armstrong Whitworth Aircraft, Ltd., and C. V. Murray.*

◇ ◇ ◇

PATENT No. 451520 describes an apparatus whereby the pilot can verify from inspection whether the pitch-changing and governor mechanisms of a constant-speed airscrew are working properly. The recorder of an electric revolution counter consists of an armature mounted on a spindle to which an insulated disc A is fixed. This disc carries two metal strips B and C, which are connected by brushes D and E to an electrical relay F, which actuates the pitch-changing mechanism. The disc also carries a pointer G. Another pointer H is operated manually by a knob and at its other end is carried a brush L, which is also connected to the electrical relay.



The Bristol constant-speed-airscrew indicator.

The knob is turned so that the pointer H indicates the engine speed required. If the engine is not running at this speed, brush L will contact with metal strips B or C, which will bring into operation the pitch-changing mechanism and the pitch of the airscrew will be varied until this predetermined engine speed is reached, and thereafter this condition will be maintained. Pointers G and H will then coincide and the pilot can thus quickly see if the mechanism is functioning correctly.—*Patent No. 451520: Bristol Aeroplane Co., Ltd., A. H. R. Fedden and F. M. Owner.*

◇ ◇ ◇

AN arrangement is described whereby the pitch of the blades of an airscrew are varied in either direction by liquid pressure. In the particular system that forms the subject of this patent the piston is fixed and the cylinder is capable of movement. The liquid is supplied to either side of the piston, and thus the cylinder is capable of moving in both directions. A further feature is that the cylinder has an extension which takes a bearing inside the propeller-shaft. The liquid, which is subjected to centrifugal force as well as high pressure, is prevented from escaping by this proposed arrangement.—*Patent No. 449407: A. A. Rubbra and E. A. Gass.*

◇ ◇ ◇ ◇

IN a variable-pitch airscrew in which the blades are displaced by oil pressure against a force produced by the centrifugal force on weights rotating with the hub, a special pump is often provided to produce this oil pressure. The present invention consists in using a single oil pump to supply oil to operate the pitch of the blades and also to lubricate the engine. As the pressure required to vary the pitch of the blades is higher than that required to lubricate the engine, the pump is arranged to deliver oil at the higher pressure, after which it may pass through suitable relief valves in order to reduce its pressure and so make it suitable for engine lubrication purposes.

The pitch-varying device can be connected at will with the high-pressure supply, at all other times it being in communication with the low-pressure supply in order to keep the oil passages full.

Details of the valves are given.—*Patent No. 447990: A. A. Rubbra and S. N. Dyson.*

◇ ◇ ◇ ◇

IN this v.p. airscrew the pitch of the blades is controlled by means of a hydraulic system which rotates at the same speed as the airscrew, and in which the torque reaction tends to displace the working fluid against centrifugal force.

There is a hydraulic coupling between the driving shaft and the airscrew shaft, and relative movement between them alters the

pitch of the blades through the action of a series of bevel wheels.

Relative movement between these shafts, and therefore adjustment of the pitch of the blades, depends on a balance in the hydraulic system between centrifugal force and torque transmitted, i.e., between speed and torque. The arrangement is such that change of pitch is capable of restoring the balance between speed and torque.—*Patent No.* 447424: *R. M. A. Rice.*

◇ ◇ ◇ ◇

IN this patent a rotary-vane type of landing direction indicator is operated by suitable electrical devices from a distant control station so that it can be set in any direction. The aim of the invention is to obtain a simple and robust construction.—*Patent No.* 450878: *Chance Bros. and Company, Limited, and L. B. H. Hallett.*

◇ ◇ ◇

IN a method of obtaining differential braking controlled by the position of the rudder bar, cables are led from two fulcrum points to the brake-operating lever, and so to the brakes. The relative position of the fulcrum points is altered by movements of the rudder bar. In this way the tension in the cables is varied and so differential braking is obtained.—*Patent No.* 450771: *J. H. Colbourne.*

◇ ◇ ◇

THIS specification deals with the mounting of the blades of a rotative wing aircraft in which the blades of the helicopter are connected to the hub from an intermediate point of their length by means of a bar which is capable of torsional deflection. This system was described in an earlier patent (No. 418698), and the present patent deals with detailed improvements in which adjustments are provided so that the torsional load on the tension member acts as a restoring couple to the blade.—*Patent No.* 448349: *A. G. Coats and R. Hafner.*

◇ ◇ ◇ ◇

IN the case of rotative-wing aircraft the steep climb and descent—more particularly the latter—produce conditions in which the direction of the airstream has a considerable vertical component, and departs therefore from the normal direction for which the fuselage is streamlined. According to this specification the fuselage is so shaped that it presents a streamline form to an upward current of air, and this assists in maintaining the longitudinal trim and directional control.

Means are also provided in which auxiliary surfaces can be controlled to vary the symmetry of the streamlining of the transverse sections in order that the drag on one side or the other near the tail may be increased or decreased.—*Patent No.* 448703: *A. G. Coats and R. Hafner.*

◇ ◇ ◇ ◇

A CLAIM is made in this specification for the use of hydraulic operating equipment, either in the form of a single double-acting jack or two single-acting jacks, in connection with a particular type of retractable undercarriage. The type of undercarriage referred to is one in which the wheel describes two rotational movements about two distinct axes, the two movements occurring simultaneously and controlled by a member of fixed length.

In the examples given the wheel is moved both sideways and backwards.—*Patent No.* 447448: *Societe d'Inventions Aeronautiques et Mechaniques S.I.A.M.*

◇ ◇ ◇ ◇

PATENT No. 448478 relates to a means for creating the hydraulic pressure used for the operation of jacks in connection with retractable undercarriages, flaps, etc. In the system described there is a hand-operated pump and also a mechanically driven pump which are interconnected and controlled by a single operating lever in the following manner. At the top of the operating lever is a knob which is capable of a slight rotation both in a clockwise and in an anti-clockwise direction. The direction of rotation determines the direction of flow of the liquid and thus raises or lowers the operated unit as required. After the initial twist of the knob, oscillatory movement of the handle works the hand-operated pump in the manner described in an earlier patent (No. 428252).

In the present invention, twisting of the knob and movement of the lever to one extreme position will cause liquid to flow from the mechanically driven pump, but if this latter is not functioning the hand-operated pump can be worked as previously described.—*Patent No.* 448478: *Automotive Products Company, Ltd., and F. V. Brown.*

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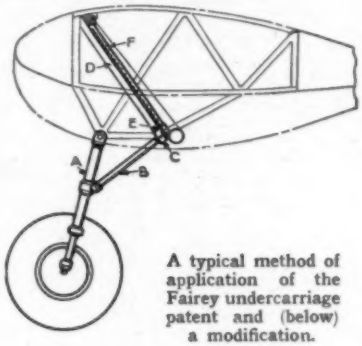
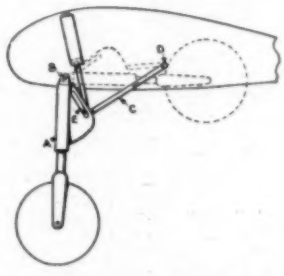
THE feature of this specification is the use of a rack and pawl device to hold the undercarriage in its lowered position and to prevent it from collapsing under loading stresses, even if it is not fully extended.

A number of different types of undercarriage to which the invention can be applied are specified, a typical one being shown in the illustration. A resilient leg A is pivoted at one end to the frame of the aircraft, and a strut B is pivoted at one end of the leg A and at the other end to a block C which slides in guides D. The block carries a pawl E, which engages with a rack F, and so prevents the undercarriage from collapsing, no matter what position it occupies. The operation of the undercarriage may be effected either by mechanical or hydraulic means, the pawl being disengaged from the rack by the initial pressure or tension.—*Patent No.* 447610: *Fairey Aviation Co., Ltd., and F. H. Ordidge.*



A typical method of application of the Fairey undercarriage patent and (below) a modification.



The type of undercarriage described in a further specification is a modification of that described above. Both members are pivoted at their upper ends to the aircraft, and the lower end of the strut is pivoted to a block in a guide. The ratchet and pawl device described in the earlier patent can be incorporated in the present scheme, so that the leg is locked against landing loads at all positions during its retraction. In the second illustration A is the leg (and shock absorber) pivoted at B, and C is the strut pivoted at D. The ratchet and pawl are in the guide E.—*Patent No.* 450929: *Fairey Aviation Co., Ltd., and F. H. Ordidge.*

The Trend of Invention—

IN order to assist aircraft to land in fog or other conditions where the visibility is very poor, it is proposed to have on the ground of the aerodrome two wireless transmitters. One of these is an omni-directional transmitter operating on a wavelength of 9 metres and is modulated by a television transmitting apparatus and which gives the name of the aerodrome, direction of wind,

The Marconi blind-approach television receiver screen. This patent is also mentioned on p. 397.

and other desirable information. The other transmitter, which works on a very short wavelength (of, say, 50 cm.), is sharply directional and is caused to swing through a given arc in a vertical plane. This transmitter is modulated by tone frequencies which vary with the degree of inclination of the beam. When the beam is horizontal a 50-cycle modulation may be applied, and this is increased to 100 for a 5-deg. inclination, and so on.

The aircraft carries two receivers and the modulation outputs are combined and fed to a television reproducer. The right-hand portion is produced by the omni-directional transmitter and the left-hand portion by the beam transmitter. The number and position of the black bars in the latter can be standardised for given positions so that the pilot will be informed of the necessary angle of glide for landing by seeing one of these patterns. On approaching an aerodrome, the right-hand portion of the picture is picked up and after circling round the left-hand portion appears. The angle of glide and direction for landing can then be determined.—*Patent No.* 450975: *Marconi's Wireless Telegraph Co., Ltd., and R. J. Kemp.*

◇ ◇ ◇ ◇

THE method described governs the vertical course of an aeroplane landing in conditions of bad visibility. It allows it to descend at a predetermined rate, correcting for wind velocity.

The time required to pass between two vertically radiated wireless signals, referred to as the advance and the main signal, are noted, and from this, a factor depending on the wind strength is obtained. This gives the time that must elapse after passing the main signal before the descent is commenced, and therefore a predetermined altitude-time course is followed.—*Patent No.* 448737: *Siemens Apparate und Maschinen Gesellschaft mit Beschränkter Haftung.*

◇ ◇ ◇ ◇

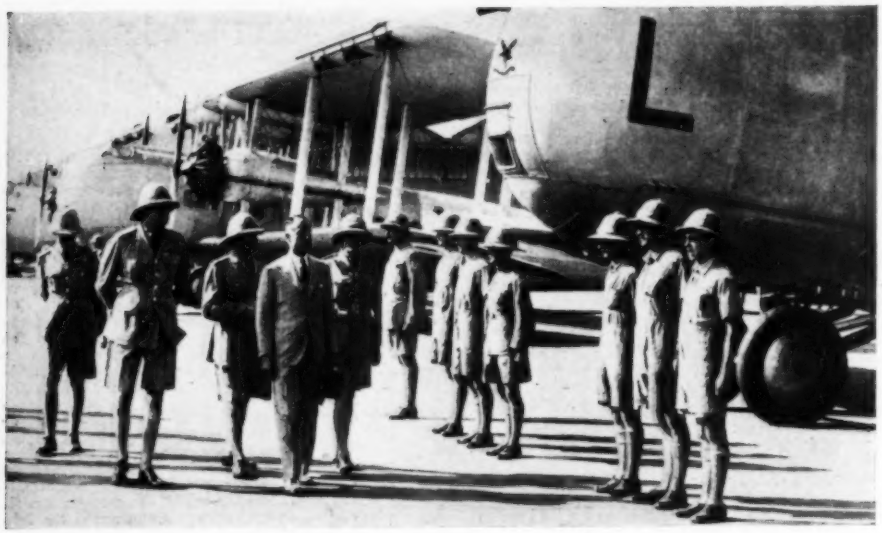
CERTAIN types of light beacons used for guiding aircraft are not only intended to indicate a given position but are also required to give particulars of direction. For this purpose the light is interrupted in such a manner that the nature and direction of the interruptions will vary according to the direction from which the beacon is viewed.

The patent describes an optical system by which such results may be obtained. In an example given, a pilot on his correct course would see a flash every 12 seconds, whereas if he was far off his course it would appear every three seconds. When between 18 deg. and 3 deg. off his course on one side he sees groups of these flashes separated by a longer interval, while groups of two flashes separated by an interval indicates that he is off his course to the same extent on the other side. The further he is off his course the more frequently does he receive his signals.—*Patent No.* 451145: *General Electric Co., Ltd., and J. M. Waldram.*

Latest registrations are listed on p. 403.

THE ROYAL AIR FORCE

SERVICE NOTES AND NEWS — AIR MINISTRY ANNOUNCEMENTS



"DONA FERENS": Sir Philip Sassoon, who is making a tour of Air Force stations overseas, inspecting No. 216 (Bomber Transport) Squadron at Heliopolis. The officers and men are drawn up in front of their Valentias and the squadron badge of an eagle holding a bomb can be seen on the nearest machine.

No. 3 FLYING TRAINING SCHOOL

The undermentioned officers and airman pilots have been awarded special assessments on completion of a course of flying training at No. 3 Flying Training School, Grantham:—

Special Distinction.

A.P/O.s P. A. Tipping, A. C. Douglas, L.A/C. Gunn, H. R.

Distinguished Pass.

L.A/C.s Edwards, H. G., Tew, P. H., Rimer, W. H. V., Searby, J. H.

NO. 230 (F.B.) SQUADRON FOR SINGAPORE

No. 230 (F.B.) Squadron is being transferred to the Far East Command, and the five Singapore III flying boats will be flown by the squadron's personnel under the command of Wing Cdr. W. H. Dunn, D.S.C., from Pembroke Dock to Singapore. The squadron was due to start on October 14, and to reach Singapore early in November.

FLYING ACCIDENTS

The Air Ministry regrets to announce that P/O. John George Spencer lost his life in an aircraft accident which occurred in Cromarty Firth on October 5 to an aircraft of No. 801 (F.F.) Squadron. P/O. Spencer was the pilot and sole occupant of the aircraft.

Also that Sergt. George Chapman Dodsworth and Acting Sergt. Walter James Devoil lost their lives in an accident which occurred at Theddlethorpe Ranges on October 6 to an aircraft of No. 218 (Bomber) Squadron, Upper Heyford. Sergt. Dodsworth was the pilot of the aircraft and A./Sergt. Devoil the passenger.

Also that, as the result of a collision in the air at Navenby, Lincolnshire, on October 7, between two aircraft of the Royal Air Force College, Cranwell, Flt. Lt. Roy James Oliphant Bartlett lost his life and Flt. Cadet Howard Frizelle Burton was injured. Flt. Lt. Bartlett and Flt. Cadet Burton were the pilots and sole occupants of their respective aircraft.

Also that Sergt. Algernon Hinchcliff Simpson, Royal Air Force Reserve, lost his life in an aircraft accident which occurred at Ellerton, near Selby, Yorkshire, on October 9. Sergt. Simpson, the pilot and sole occupant of the aircraft, was undergoing training.

ROYAL AIR FORCE GAZETTE

London Gazette, October 6, 1936

General Duties Branch

Group Capt. R. Leckie, D.S.O., D.S.C., D.F.C., A.D.C., is appointed Director of Training, at the Air Ministry, October 5, vice Air Comdre. A. W. Tedder; Sqn. Ldr. F. Beaumont is granted the acting rank of Wing Commander (unpaid) (September 21); Flt. Lt. J. Goodhart is granted a permanent commission in that rank (September 11); Lt. R. H Humphries (The Prince of Wales's Volunteers) is granted a temporary commission as Flying Officer on being seconded for duty with the Royal Air Force (September 22).

The following Acting Pilot Officers on probation are confirmed and graded as Pilot Officers on the dates stated:—(August 6):—A. S. Ainslie, C. D. Beaumont, J. R. I. Bell, W. A. L. Davis, J. N. W. Farmer, G. E. Ford, J. H. Greswell, J. D. Harris, R. G. Kerr-Ramsay, R. N. Lambert, A. W. Lee, G. Lowe, V. E. Marshall, W G. Moseby, K. Slater, D. C. Smythe, F. G. R. Thomas, G. Thomas, G. M. Wyatt; (August 26) B. Bell, W. H. Biddell, E. J. Brooks, P. D. D. Carlton, B. E. Dobb, C. E. Drapper, A. Hibberd, M. W B. Knight, W. D. Morford, T. F. D. Morgan, G. H. F. Plinston, W Riley, F. E. Rosier, B. J. Sandeman, J. M. H. Sinclair, H. W. Tennant, J. S. Tupholme, P. R. Walker, J. T. Webster.

The following Flight Lieutenants are promoted to the rank of Squadron Leader (October 1):—F. H. Shales, P. Murgatroyd, G. R. O'Sullivan, E. F. Haylock, R. W. Hill, D. W. F. Bonham-Carter, L. K. Barnes, M.B.E., J. S. L. Adams, D. S. Brookes, R. S. Blucke, R. G. Hart, M.C., R. E. Bain, A. F. Hutton, D.F.C., C. F. Sealy, E. S. C. Davis, A.F.C., J. H. C. Wake, W. C. P. Bullock, D. A. Boyle, C. H. A. Stevens, E. C. Dearth, H. M. Groves, J. R. D. Goadsby.

The following Flying Officers are promoted to the rank of Flight Lieutenant on the dates stated:—W. H. F. Mitchell (September 1); D. Price (September 3); W. M. Keddie (September 11); H. V. Horner (September 13).

P/O. B. G. Morris is promoted to the rank of Flying Officer (September 16); Sqn. Ldr. R. J. Sanceau is placed on the retired list at his own request (October 1); Sub-Lt. K. W. Ross, R.N., Flying Officer R.A.F., relinquishes his temporary commission on return to Naval duty (March 20) (substituted for the notification in the *Gazette* of March 31); Flt. Lt. R. Kellett is seconded for service with the Imperial Japanese Army (September 25); Flt. Lt. D. J. Harrison is transferred to the Reserve Class A (September 30).

The short service commissions of the undermentioned Acting Pilot Officers on probation are terminated on cessation of duty (September 29):—R. C. Cox, G. S. Braithwaite.

Stores Branch

Flt. Lt. J. R. R. Harvey, M.M., is placed on the retired list at his own request (October 5).

Medical Branch

C. E. G. Wickham, M.B., B.S., M.R.C.S., L.R.C.P., is granted a short service commission as a Flying Officer with effect from September 10, and with seniority of March 29.

The following are granted short service commissions as Flying Officers with effect from September 7 and with seniority of the dates stated:—J. R. Cellars, M.B., Ch.B., D. J. Dawson, M.R.C.S., L.R.C.P., P. A. Lee, M.B., Ch.B., G. B. Macgibbon, M.B., Ch.B., D. F. S. Shaw, M.B., Ch.B., A. R. Sibbald, M.B., Ch.B. (September 7, 1935); C. C. Barker, M.B., Ch.B. (November 5, 1935); J. Conroy, M.B., Ch.B. (December 19, 1935); N. P. R. Clyde, M.B., Ch.B. (January 31); J. D. H. Cran, M.B., Ch.B. (February 26); W. J. Mitchell, M.R.C.S., L.R.C.P. (March 9)

Memorandum

The permission granted to Sec. Lt. K. E. Martienssen to retain his rank is withdrawn on his conviction by the civil power (Sept. 3).

ROYAL AIR FORCE RESERVE

Reserve of Air Force Officers

General Duties Branch

F/O. C. Hole is granted a commission as Flight Lieutenant in Class C (August 26).

The following Class E reservists are granted commissions as Pilot Officers on probation in Class A (September 8):—351794 Sergt. L. J. Dixon, 297743 Flt. Sergt. H. A. Marsh, 157539 Sergt. F. P. J. McGevor, D.F.M., 364251 Sergt. H. A. Roxburgh.

The honorary rank of Flight Lieutenant granted to F/O. J. A. Simpson is withdrawn on termination of his employment with the Royal Air Force as a Station Adjutant (September 2); Flt. Lt. H. D. Davis, A.F.C., relinquishes his commission on completion of service and is permitted to retain his rank (August 21).

The following Flying Officers relinquish their commissions on completion of service and are permitted to retain their rank:—H. E. Duncan (August 21), D. C. Burnley (September 15).

The following Flying Officers relinquish their commissions on completion of service on the dates stated:—I. R. Scott (May 12, 1935), W. D. T. Gairdner (July 10), P. W. A. Dudgeon (July 18), K. F. Jones (July 18), R. W. Aitken (August 10).

Flt. Lt. E. J. Spearing (Flying Officer, R.A.F., retired) relinquishes his Reserve commission on completion of service (September 7); F/O. P. B. Chubb resigns his commission and is permitted to retain his rank (August 22).

Medical Branch

Flt. Lt. G. Dunderdale, M.D., B.S., M.R.C.S., L.R.C.P., relinquishes his commission on completion of service (August 18)

AUXILIARY AIR FORCE

General Duties Branch

No. 600 (CITY OF LONDON) (FIGHTER) SQUADRON.—F/O. R. N. Frankland relinquishes his commission on completion of service (June 22).

No. 601 (COUNTY OF LONDON) (FIGHTER) SQUADRON.—C. R. Davis is granted a commission as Pilot Officer (August 7).

No. 604 (COUNTY OF MIDDLESEX) (FIGHTER) SQUADRON.—Flt. Lt. J. Cherry relinquishes his commission on completion of service (August 19).

No. 609 (WEST RIDING) (BOMBER) SQUADRON.—P. Drummond-Hay is granted a commission as Pilot Officer (August 28).

No. 611 (WEST LANCASHIRE) (BOMBER) SQUADRON.—D. W. S. Howroyd is granted a commission as Pilot Officer (August 18).

Medical Branch

No. 611 (WEST LANCASHIRE) (BOMBER) SQUADRON.—W. D. Peock, M.B., Ch.B., is granted a commission as Flying Officer (August 10).

AUXILIARY AIR FORCE RESERVE OF OFFICERS

General Duties Branch

R. N. Frankland is granted a commission as Flying Officer in Class A (June 22); J. Cherry is granted a commission as Flight Lieutenant in Class A (August 19).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Squadron Leaders.—C. L. Falconer, to No. 5 Flying Training School, Sealand; for duty as Chief Flying Instructor vice Sqn. Ldr. H. I. T. Beardsworth, 28.9.36. J. L. Kirby, to No. 215 (B) Squadron, Driffield; for flying duties, 27.9.36. C. Rapley, to R.A.F. Station, Halton; for engineer duties, 27.9.36.

Flight Lieutenants.—E. A. Healy, to No. 107 (B) Squadron, Andover, 25.9.36. H. F. Luck, to R.A.F. Balloon Centre, Rollestone Camp, 25.9.36. J. R. Mutch, to No. 1 School of Technical Training (Apprentices), Halton, 25.9.36. R. Kellett, to Special Duty List; seconded for service with the Imperial Japanese Army, 25.9.36. N. A. R. Halliday, to No. 2 (Indian Wing) Station, Risalpur, 25.9.36. G. F. Simond, to No. 36 (T.B.) Squadron, Singapore, 13.9.36. J. P. Cecil-Wright, to No. 230 (F.B.) Squadron, Pembroke Dock, 28.9.36. J. A. Easton, to No. 3 Flying Training School, Grantham, 24.9.36. R. L. Kippenberger and W. W. Stainthorpe, to Superintendent of the Reserve, Hendon, 28.9.36. Hon. G. R. Ward, to R.A.F. Station, Gosport, 18.8.36. R. L. Mills, to No. 48 (G.R.) Squadron, Manston, 28.9.36. M. Q. Candler, to R.A.F. Station, Bircham Newton, 30.9.36. F. H. Whitmore, M.B.E., D.S.C., to No. 1 Armament Training Camp, Catfoss, 27.9.36.

Flying Officers.—R. J. Knights-Whittome, to Headquarters, No. 24 (Training) Group, Halton.

The undermentioned are posted to No. 1 Flying Training School, Leuchars, on appointment to temporary commissions on being seconded from the Army with effect from 14.9.36:—J. Macdougall, B. C. Mallinson, A. R. W. Shipley, W. G. Tailyour, I. C. B. Worthington-Wilmer, J. L. Yeatman, and R. H. Humphries.

Flying Officer.—W. B. Murray, to No. 1 School of Technical Training (Apprentices), Halton, 25.9.36.

Pilot Officers.—T. M. Buchanan, F. O. Dickson, and R. H. M. Heriot-Hill, to No. 822 (F.S.R.) Squadron, 26.9.36. A. J. Trumble, to No. 801 (F.F.) Squadron, 25.9.36. C. F. Herington, to No. 811 (F.T.B.) Squadron, 25.9.36. M. E. W. Scott-Mackirdy, D. O. F. Lumsden, C. S. Cooper, to No. 811 (F.T.B.) Squadron, 24.9.36.

Acting Pilot Officers.—P. B. Unitt, to No. 8 Flying Training School, Montrose, 10.9.36.

The undermentioned are posted to No. 8 Flying Training School, Montrose, with effect from September 5, 1936:—H. E. Angell, R. G. Dutton, G. V. Gordon, T. G. Kirby-Green, M. L. ff. Beytagh, S. E. Bussey, P. Edwards, C. E. A. Garton, A. J. Hudson, C. P. Igglesden, M. O Scott, C. H. Ancil, G. C. C. Bartlett, J. C. Burge, K. T. B. Burns, M. J. Casey, J. D. D. Collier, P. M. Compston, V. H. Furlong, A. W. Heward, P. C. Rolls, C. H. Milton, S. L. Ring, E. A. Williamson, J. G. H. Potter, K. W. C. Bindloss, H. D. Green, H. W. McMillan, and M. J. B. Young.

The undermentioned are posted to No. 2 Flying Training School, Digby, with effect from 19.9.36:—R. H. Batt, J. N. Culverwell, D. S. Forsyth, R. E. Shorter, C. B. G. Robinson, W. J. Smith, J. G. W. Swain, T. W. Rippingale, R. N. Bateson, K. W. Bonnar, F. G. O. Box, A. H. Boyd, A. J. Carver, L. M. Craigie Halkett, P. H. Crompton, J. Dugdale, C. E. Ealand, P. E. B. Martin, P. Folkes, C. A. Harris, D. B. Harris, A. J. Madge, P. W. V. Massy, E. Parker, A. S. Phillips, H. C. M. Pollard, P. Tomlinson, L. A. H. Wardill, E. D. J. R. L. Whatley, S. G. Wise, J. N. Collins, and J. L. Robinson.

The undermentioned are posted to No. 6 Flying Training School, Netheravon, with effect from 19.9.36:—P. G. Abercromby, R. Baron, W. A. Toyne, H. F. Wood, J. P. Dyer, L. N. Barker-Simson, J. A. H. Cooper, P. L. Dakeyne, K. H. V. Day, F. N. Hughes, R. J. Kelsey, F. O'Driscoll, B. T. Scott, J. D. Stephens, J. F. Armstrong, R. H. Davis, E. H. Thomas, J. Tudor-Evans, A. K. Byrne, B. Drake, L. S. S. Edeson, M. I. Murdock, A. A. Proctor, R. F. T. Giddings, B. Romanoff, H. I. A. Swayne, C. M. Wheatley, and K. J. McDonald.

The undermentioned are posted to No. 11 Flying Training School, Wittering, with effect from 12.9.36:—R. B. Barker, S. E. A. Brown, J. M. Hewson, R. Hutchinson, J. G. W. Jones, C. D. Lavers, B. A. Mitchell, D. S. Pain, T. H. Parrott, J. L. Rees, C. A. Vernieux, J. M. Warren, D. C. B. Riddick, J. J. Bennett, R. N. Haynes, G. R. N. H. Jan, G. H. John, W. J. Macrae, G. A. P. Manwaring, D. D. Middleton, T. V. Poltock, D. F. Elliot, J. E. Riepenhausen, C. A. Rotherham, F. E. O. Temple-West, G. A. Thompson, H. E. Vickery, T. K. Milne, J. H. T. Pickering, and J. S. Sherwood.

Stores Branch

Squadron Leader.—D. W. Dean, to No. 3 Stores Depot, Milton; for Stores duties vice Sqn. Ldr. W. C. Green, 9.9.36.

Flight Lieutenants.—M. H. Robinson, to No. 4 Flying Training School, Abu Sueir, Egypt, 5.9.36. E. F. Smith, to No. 3 Stores Depot, Milton, 27.9.36.

Pilot Officer.—D. H. M. Graham, to Aircraft Depot, Hinaidi, Iraq, 26.9.36.

Accountant Branch

Wing Commander.—I. L. Wincer, to R.A.F. Depot, Uxbridge; for Accountant duties vice Wing Cdr. W. G. W. Prall, 28.9.36.

Flight Lieutenant.—J. H. Glenn, to R.A.F. Station, Hucknall, 1.10.36.

Flying Officer.—A. Gollan, to No. 1 Flying Training School, Leuchars, 27.9.36.

Medical Branch

Squadron Leader.—G. J. Hanly, to Princess Mary's R.A.F. Hospital, Halton; for duty as Medical Officer, 26.9.36.

Flight Lieutenants.—E. Thompson, to Central Medical Establishment, London; for duty as Medical Officer, 28.9.36. F. W. P. Dixon, M.B.E., to Central Medical Establishment, London, 26.9.36.

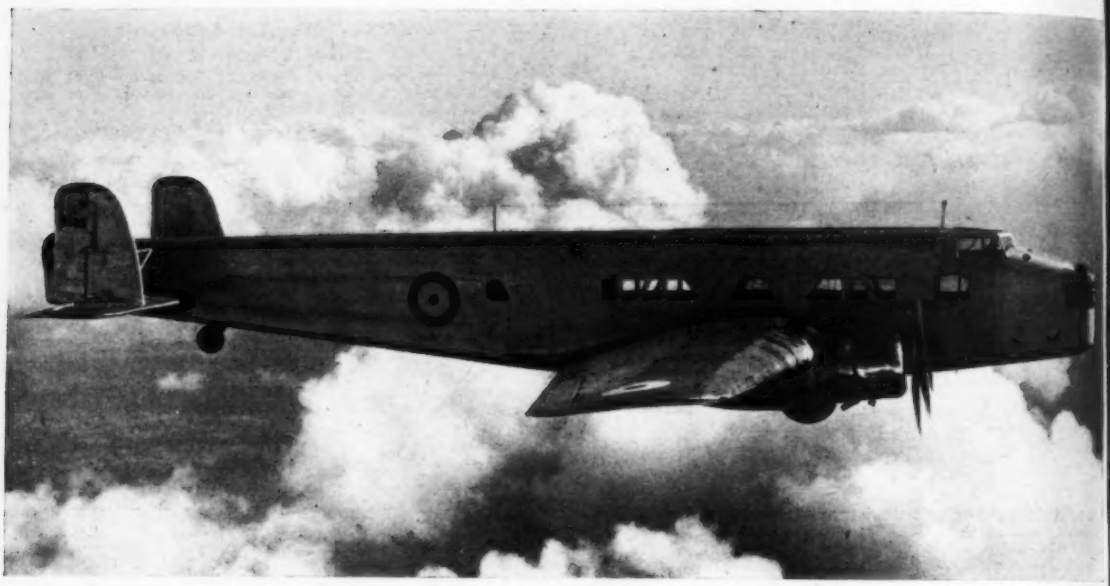
Dental Branch

Flight Lieutenant.—S. C. Allen, to No. 3 Flying Training School, Grantham, 28.9.36.

Flying Officer.—I. St. C. Alderdice, to R.A.F. Station, Boscombe Down, 24.9.36.

COMMERCIAL AVIATION

— AIRLINES — AIRPORTS —



CIVILISING INFLUENCE : The Armstrong Whitworth XIII Bomber Transport which is being handed over to Imperial Airways after suitable modifications have been made for its use as a transport rather than as a bomber. This machine has been fitted with Tiger IX's (790/880 h.p.) and D.H. v.p. airscrews and was designed to carry twenty-four soldiers with full equipment. It might be suggested that the nose and tail cupolas should be retained for use by any passengers who are prepared to pay for the excellent view obtained. (*Flight* photograph.)

THE WEEK AT CROYDON

Halving to Duplicate : Passengers' Foibles : The Rotating Airport Again

THE popularity of air travel has not waned with the passing of the summer season. One or two companies —such as K.L.M., which reduced the number of services on October 4—have found it necessary to duplicate a number of these services remaining, and the number of passengers carried has been equal to that carried when more services were run. Imperial Airways have continually duplicated their Paris services, and Air France, Swissair and D.L.H. report full loads. One passenger last Saturday, unable to get a seat on any machine leaving for Holland, finally flew to Brussels and made the rest of the trip to Amsterdam by train.

One of the difficulties the air companies experience, which has been mentioned in *Flight* more than once, is that concerning the passenger or passengers who arrive when the machine is almost due to leave. Such persons must either be left behind for the sake of punctuality or punctuality is impossible. The new K.L.M. time-table, like someone or other in *Through the Looking Glass*, says very loud and clear, "Passengers are requested to be at the departure station or airport at least fifteen minutes before departure." And will they? Not if I know the air traveller. Another funny thing about passengers is the mysterious way in which newspapers and periodicals, placed in aeroplane cabins for their delectation, will disappear out of the leather covers provided unless the steward or stewardess has a gimlet eye in such matters. This tendency is not new, for when one Shillibeer put the first three-horse omnibus on the London streets he provided reading matter. The practice was shortly discontinued because the stuff vanished.

I hear that Mr. Bjorkvall, the Swedish Atlantic flyer, booked to travel home by K.L.M./A.B. Aerotransport last Tuesday. On the previous Saturday a small red aeroplane of well-known English make arrived at Croydon from Sweden with newspaper men and movie camera folk. It seems to belong to an enterprising newspaper called the *Stockholm Tidingen*. After refuelling it set off for Ireland.

Every now and then I receive a circular about a rotating airport to be built, at a cost of a mere two million pounds or so, in the heart of London on stilts about 300ft. high ("to clear the fog belt"—but how about low cloud?). Evidently we are on the wrong track when we demand bigger landing areas and huge fog runways, and we ought to have no difficulty at all in finding a rotating airport amongst city steeples and towers in thick fog and, when it is found, have no difficulty in landing on it. Having landed, however, there would be no further difficulties, such as overrunning the edge, for there is to be a powerful electro-magnetic aircraft retarder, the effect of which will be "to firmly anchor the tail of the machine to the runway." Pilots whose teeth are loose in their sockets should retire from business before the scheme comes into force; and designers should get busy, it seems, with elastic tail-pieces. Rotating airports, so far as Croydon people are concerned, meet with little enthusiasm. Practical experience, of course, is lacking except on the morning after the annual airport

dinner, so it may be mere conservatism that stops the average airline pilot from rejoicing at the prospect. Incidentally, the document which reached me gave, as an example of time-lag, the ground travel time from King's Cross to Hillman's Essex airport!

One of the services which has been suspended for the winter is the K.L.M. Rome Air Rapide which linked London, *via* Amsterdam, with Rome. It was mainly flown by Commanders Parmentier, van Weywrother and Holzmeyer, and it is interesting, considering the difficulty of the route, to hear that it ran with 100 per cent. regularity throughout the summer, operated with Douglas D.C.2 machines.

Irish Sea Airways have reduced the fares for the winter season on the Dublin-London route for "encouraging" purposes. The reduction is a substantial one, as much as £4 being saved on certain classes of week-end return ticket.

A. VIATOR.

Heston's Gasholder

WITHIN a week the ring of red obstruction lights on the summit of the Hayes gasholder should be in use—much to the relief of all transport and other pilots who fly at night or in conditions of bad visibility. At the moment everything is ready and the gas company is only waiting for "a word" from the Air Ministry before switching on. It is many months since an official promise was given that something would be done, and many years since the gasholder became a danger to air transport. However, nobody flew into it.

Fourteen Dewoitines for Air France

THE twenty-two-passenger Dewoitine 338, which cruises at 165 m.p.h., is to play a bigger part in the equipment of Air France than was at first intended. The prototype, which recently made a 7,000-mile tour of Russia and is now on the Paris-Marseilles service, proved so satisfactory that the order for eight more has now been increased to fourteen, and it is stated that they will all be in service before the Farman 224 40-seaters are ready. It has been planned to exhibit the first of the big Farmans at this year's Paris aero show, which opens on November 15.

Overland

ACCORDING to a Paris correspondent of the *Daily Telegraph*, the position of a flying-boat landing point in Central France has already been decided upon by Imperial Airways. This is to be on the River Saone, at Macon, and the first experimental landing will be made next month. The base, of course, is solely for the use of the long-distance boats flying to Durban and the East.

Meanwhile one of the D.L.H. diesel Dorniers is due to arrive in Ireland for a North Atlantic crossing. Two crossings of the South-North Atlantic have already been made by D.L.H., who have permission to make a number of experimental flights before July of next year.

The New Douglas Boat

DESIGNATED the model DF, the new Douglas twin-engined monoplane flying boat, illustrated in *Flight* last week, has been planned as a 32-passenger machine with a non-stop full load cruising range of 1,500 miles. With only 12 passengers a range of 3,300 miles is claimed. A pilot, co-pilot, radio operator and stewardess are normally carried. Maximum and cruising speeds are 185 m.p.h. and 167 m.p.h. respectively on the power of two of the new "G" series Wright Cyclones. The gross weight is 28,500 lb., the span 95ft., and the overall length 70ft.

The main cabin is divided by bulkheads into four compartments. In addition to the pilots' cabin there is a stewardess' buffet cabin, separate men's and women's lavatories, and compartments for baggage, mail and cargo.

The machine has been built for demonstration to airlines in all parts of the world.

Sky Advertising

WITH the excellent idea of bringing together those who are interested in various forms of aerial advertising, Aerial Sites, Ltd., staged an informal little party at the Hanworth Park Hotel last Friday. In a short speech, Capt. L. Murphy, the director of the company, explained the major objects of this type of advertising, which, he said, was not intended to be used for telling a complete message, but for placing a name before the public. The message could then be completed through more normal mediums. Sky advertising, therefore, did not in any way compete with other forms of advertising. Mr. Keith Jopp, ordered to his feet without previous notice to support the chairman, then amused the populace with stories of herons and things.

Later on there was to have been a demonstration of an improved form of neon sign flying, but the weather proved rather too much for Mr. Freeman, the pilot, who was probably lucky to find Heston again.

The Compleat Navigator

THOSE pilots with the second-class navigation hurdle still to surmount will shortly be able to obtain a special manual covering the Air Ministry syllabus for this examination. This book is intended to overcome the usual difficulty involved in sifting the extraneous matter to be found in the recommended books of study, many of which were written for marine navigators, and is written by one of the best-known coaches in air navigation—Mr. C. W. Martin.

To be called *Martin's Air Navigation*, this guide gives, in addition to all the necessary information concerning mathematics, charts, compasses, meteorology, dead reckoning and legislation, a set of specimen papers and "model" answers. It is to be published by the Eversley Press, Ltd., 33-34, Craven St., Strand, London, W.C.2, at a cost of 21s.

Television in Air Transport

A PATENT specification from Marconi's which has recently been published, suggests that some of the advantages of television transmission and reception may shortly be applied to thick-weather air navigation.

Briefly, the patent covers the use of two transmitters and a television receiver. One of the transmitters is omni-directional, operating on a wavelength of 9 metres and modulated by a television set; this gives the name of the aerodrome, the direction of the wind and other information. The second transmitter, with a wavelength of 50 cms. is "sharply directional," and the beam is caused to swing through an arc in a vertical plane. The tone frequencies vary with the degree of inclination.

On his television reproducer the pilot will see patterns which will indicate both the direction of approach and the necessary angle of glide. The actual specification, in simplified form, is published, with a diagram of a pattern, on page 393.

Lightening Doncaster's Darkness

ON Thursday night, with suitable ceremony, Doncaster aerodrome's night landing outfit was officially used for the first time. The floodlighting equipment has been installed by Chance Bros., and the boundary beacons by the Cardiff Foundry and Engineering Co. Representatives of both these companies were present, and Mr. Malcolm (who, with his partner Mr. Farquharson, is the agent for the boundary lights in this country) flew up from Heston.

The aerodrome was floodlit at 8 p.m. and two night bombers from Finningley came over and made a series of landings by way of a demonstration. Among those present were the Mayor (Councillor Johnson), the chairman of the aerodrome committee (Councillor Thomson), and Mr. Ford, the borough surveyor, who has been largely responsible for the aerodrome layout.

The Monospar Croydon

AFTER a period of silence, relieved only by the news that faint "S O S" signals had been heard on a bearing of 290 deg. from the D/F station at Darwin, information of the lost Monospar *Croydon* was first received on Friday morning. The machine had landed safely on a reef some four hundred miles west of Darwin, and the crew of four, including Mr. Tim Wood, the pilot, and Mr. F. F. Crocombe, the designer, was eventually picked up by a steamer bound for Durban, South Africa.

Mr. Crocombe stated that they had received a series of bearings from Darwin showing that they were on their correct course, and, as these had not changed, they had imagined that the machine's compass was out of order. This would be a fair assumption in view of the magnetising troubles experienced during the construction of the *Croydon*.

Since, later, the S O S bearings obtained by the Darwin station gave the machine's position as being on a line crossing Timor, it has been suggested that there was something seriously wrong at this D/F station. An enquiry is to be made by the Australian authorities.

Commercial Aviation

IN CHINA TO-DAY

The Services Now Being Operated in a Country "Made for Air Transport": A Market Worth Attention

ALTHOUGH various military factions in China began to take a serious interest in aviation as far back as 1921, regular commercial flying did not get under way until 1930. Following the beginning made in that year, however, a growing appreciation of the value of air communications, owing to the great distances to be covered and the general lack of adequate transport services, has resulted in a considerable extension of air routes.

Three companies now operate in China, providing lines over a total of about 8,870 miles. The China National Aviation Corporation is a Sino-American company which was founded in July, 1930. It uses eleven American machines and employs eleven Americans, one German, and twelve Chinese pilots. Eight separate services are in operation:—

(1) Shanghai-Chengtu; (2) Shanghai-Hankow; (3) Hankow-Chungking; (4) Chengtu-Chungking; (5) Chungking-Kweiyang; (6) and (7) Shanghai-Peiping; and (8) Shanghai-Canton. The following table shows the progress made by this company in the number of miles flown and passengers and mails carried:—

	Miles.	Passenger-Miles.	Passengers.	Mail.
1932	431,133	775,000	3,153	112,106 lb.
1935	1,174,000	3,650,000	10,400	141,000 lb.

The Eurasia Aviation Corporation is a Sino-German company using German machines exclusively as well as German pilots, although it is understood that efforts are being made to train Chinese. This company maintains a fleet of eight Junkers and operates the following services:—

(1) Shanghai-Lanchow; (2) Peiping-Chengchow; (3) Lanchow-Paotou; and (4) Sian-Yunnanfu, *via* Chengtu.

It was the original intention of the Eurasia Aviation Corporation to establish a service between Berlin and Shanghai, but, owing to political difficulties and to disturbed conditions over part of the proposed route, this has not so far been possible. Meanwhile, evidence of the progress made by this company is provided in the comparative statement shown below covering their operations the past two years:—

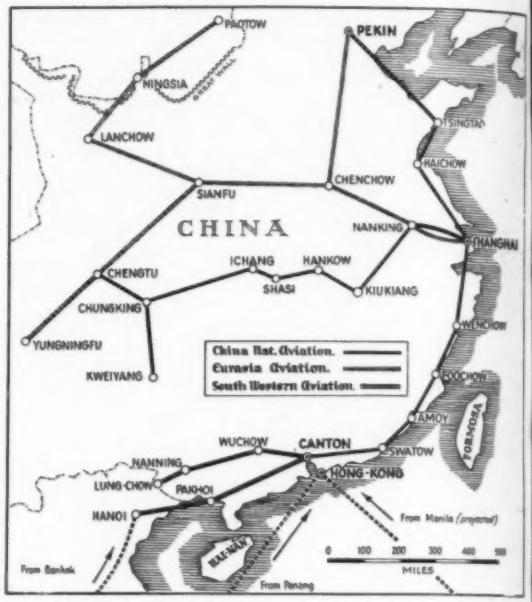
	Passenger Miles.	Passengers.	Mail.	Freight.
1934	374,862	1,476	14,244 lb.	117,225 lb.
1935	462,757	2,968	17,710 lb.	179,873 lb.

The South Western Aviation Corporation is a Chinese company using Stinsons, flown by Chinese pilots. The chief service operated by this company has been from Canton to Wuchow, Nanning, and Lungchow on a twice-weekly basis. A few weeks ago arrangements were made to extend this service to Hanoi, the Far Eastern terminus of Air France, 5½ hours air distance from Canton, thus providing a connection between the principal Chinese cities and Europe. However, the disturbed military situation in South China, added to the reported withdrawal of a financial subsidy by the Canton military leaders, has interfered with the regular running of this service, and it has not so far been established on a regular basis. The only other service which has been operated by South Western Aviation is twice weekly from Canton to Pakhoi, the flight taking 5½ hours.

Air mail facilities are provided on all the regular routes now in operation in China at an extra charge of about 4d. for each 20 grammes, or fraction thereof, for each flying zone (621 miles), in addition to the regular postage charge of about a penny for each 20 grammes.

As the Central Government at Nanking does not permit foreign air services to fly over Chinese territory, with the exception, as already stated, of the Canton-Hanoi line operated by the South Western Aviation Corporation, which is Chinese-owned, there are no connecting services to Chinese cities by lines operating to the Far East from Europe. Imperial Airways, however, after carrying out a series of survey flights over a period of six months, started a service last March, once a week, between Penang and Hongkong, which links the latter city with the Imperial Airways service operating between Great Britain and Singapore. As Hongkong is only 2½ hours by train from Canton, this service accordingly offers an alternative route from Chinese cities to Europe to the one provided by Air France.

Pan-American Airways, which started experimental services across the Pacific towards the end of 1935, are so far using Manila as their Oriental terminus. This company may eventually extend its service to the Portuguese port of Macao or to Hongkong in lieu of the privilege of landing on Chinese soil at Canton.



A map of China's regular air services as they appear to-day. The broken lines indicate the present air connections with the outside world; from left to right these are by Air France, Imperial Airways and Pan-American Airways—the latter's being the projected extension to the trans-Pacific route.

Private flying has not so far been permitted in China. However, the China Aviation League, founded in 1933 under the auspices of the Nanking Government, has been actively engaged in the encouragement of flying, particularly as a means of national defence. Resulting from these efforts, the first flying club in China was opened in June at Lunghwa airport, about eight miles from Shanghai.

During the three years 1933 to 1935, inclusive, the total value of imports of aircraft and accessories into China was as follows: 1933, 6,080,648 gold units; 1934, 4,455,577; and 1935, 1,028,095 gold units.

While the imports of aircraft and accessories in 1935 show a heavy decline from 1934, the figures do not really reflect the true position, as apparently the figures covering the Government's imports in 1935 have been excluded from the customs returns. It is known, however, that the Government purchased considerable numbers of aeroplanes last year. The figures shown for 1935 probably consist chiefly of aeroplanes and accessories of one kind or another imported by the various private companies, and possibly to some extent represents those purchased by the Government.

During the past few years the United States has led in supplying civil, as well as military, material to China. A great deal of the success of the American and Italian firms in this market has been attributed to the existence of Air Missions from these two countries. The American Mission, which was composed of civilians without official status, completed the three-year contract in 1935 and withdrew. The Italian Mission, which arrived in October, 1931, and which has full military status, is still in existence.

Apart from the work carried out by these foreign Missions, further stimulus to aviation has been provided by the erection of two factories in Hangchow in Central China and Shiukwan in Kwangtung Province in the south, by the Curtiss-Wright Company. A Sino-Italian factory is under construction at Nanchang, and a Sino-German factory is projected.

Indicators point to a continuous expansion in air services throughout China, and it is probably true to say that there are few countries in the world, in view of the great distances to be covered, likely to benefit to the same extent from air transportation.

"VIBRATORY LIGHT"

The Problem of Bad Visibility Attacked from a New Angle: Giving the Eye a Chance: The Sinterae Fog Beacon

FROM time to time since transport became of serious importance to the human race optimistic people have endeavoured to produce a form of light which would "penetrate" fog or mist. All manner of inventors have made a number of claims, but the results have never come up to expectations. In modern times it would seem that only the infra-red part of the light spectrum has shown any marked ability in this direction—and this ability is largely nullified by the fact that it cannot be seen by the human eye. If we are to depend on instruments at all it would be more logical to use the radio wave-bands and to develop television.

The latest experiments in what can only be called the straightforward field of fog penetration do, however, show a great deal of promise. Mr. Leslie G. Toplis, the inventor concerned, has not attempted to manufacture a special form of light, but has endeavoured to use light in such a way that the human eye can make the most of it.

The principle behind his idea is quite simple and sound. Everybody knows that a moving object is more easily detected than a stationary object, and many people have discovered that the parts of the retina which are not normally used are a good deal more sensitive than the central area. Experiment has also shown that maximum acuity is obtained only during the first tenth of a second after the appearance of an object in the field of vision.

Mr. Toplis's lamp, therefore, not only flashes approximately ten times a second, but the position of the point or strip of light is altered at each flash. The principle has been successfully applied to a beacon which has been installed at Tilbury since the autumn of 1934, and is, of course, applicable in many forms to the needs of the aviation community. Position beacons and fog-landing strips are uses which come to mind immediately.

Recently, by means of an artificial liquid "fog" of accurately measured density and in which the particles were similar to those of the droplets of normal fog, the idea was very successfully demonstrated to *Flight* by Mr. Toplis. Whereas a normal point of light could be discerned at a distance of 33.5 inches,

The principle of the Sinterae beacon shown diagrammatically in relation to the human eye.

the "Sinterae" beacon, as it is called, could be picked up at 50.2 inches. These figures, of course, would vary with different observers, but the increase of visibility is certainly pronounced. The test was carried out in artificial daylight conditions.

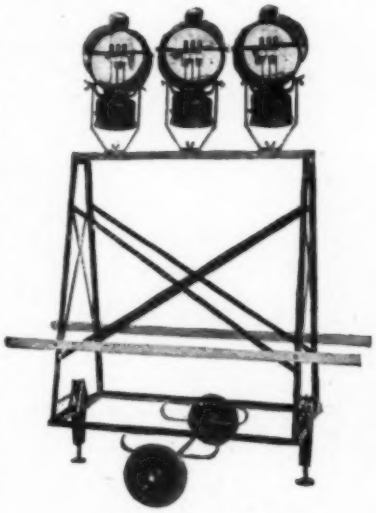
A simpler demonstration, designed, so to speak, to state the initial premise concerning visual acuity, was even more startling. An object was placed in the tank in such a position that it could not be seen at all by the observer, yet when this object was moved quickly from side to side its outline was clearly discernible.

The beacon and vibratory lighting unit are handled by Sinterae, Ltd., 54, Victoria Street, London, S.W.1, and the former is already under consideration by the Air Ministry.

Inexpensive Floodlighting

FOR a long period the Tilley Lamp Company has specialised in paraffin vapour lamps of various types, all of which give an extremely brilliant light. They have now adapted the principle to a portable floodlighting equipment which should find considerable use for aerodrome work in cases where low initial and operating cost are primary considerations. The equipment, as will be seen from the illustration, consists of three Tilley "searchlight" parabolic reflector projectors, each fitted with three burners having incandescent mantles. Each projector can be independently swung to throw its light in any required direction. It is stated that the projectors will give an amply illuminated run of some 800 yards.

The projectors consume a total of one pint of paraffin an hour, and the entire running cost is 1½d. an hour. The burning capacity is 12 hours. The whole equipment is very strongly made and is completely rainproof and windproof. It can be lighted up in five minutes and handled by one man. The weight of the equipment complete is 2 cwt. 10 lb., the height 8ft. 9in., width 6ft. 6in., and wheelbase 4ft. The price complete is £55, or the various units are obtainable separately. Full details are obtainable from the Tilley Lamp Co., Brent Works, Hendon, N.W.4.



The Tilley floodlight.

More Help for Examinees

FOR years past the Metropolitan Services College at St. Albans has, by means of its correspondence classes, prepared students for Army examinations, and in the five years 1932-36 its students secured 155 passes out of 235 for the Staff Colleges at Camberley and Quetta. Last year the College decided to add to its curriculum courses of instruction for Air Force examinations. It prepares students for the qualifying examination for Andover, and for the competitive examination of short-service officers applying for permanent commissions as specialists. Recently it has also added to its curriculum five courses for the Second Class Civil Air Navigator's Licence.

As an example of the type of instruction given for the navigators' examinations, the course in meteorology, a copy of which has been sent for our inspection, appears to be very thorough indeed, though the student is naturally expected to use the *Manual of Air Navigation* and the *Air Pilot* while covering the course. This consists of some ninety foolscap sheets with diagrams, examples, "self-examination" and test papers.

The D.C.3 in Europe

ON Wednesday, October 7, the s.s. *Statendam* arrived at Rotterdam from New York. On board was the first of the Douglas D.C.3 21-seater luxury liners for K.L.M. According to photographs this machine not only provides genuine luxury for day flying, but also converts into a real sleeper with as much and in some respects with more comfort than is obtainable on any train.

There are four four-berth cabins, privacy being ensured by heavy curtains, whilst each bunk has its own windows, air vents, reading light and electric bell. The berths, incidentally, are real beds, being 36 in. wide and 6 ft. 5 in. long. Separate lavatories are provided for men and women and there is a kitchen for full service of meals and refreshments.

Commander Scholte, who took delivery of *Ibis* at Santa Monica and flew it to New York, was aboard the *Statendam*. The machine was immediately taken to the Waalhaven (Rotterdam) airport for erection, and, although no news is yet to hand, it is probable that it flew over Netherlands territory for the first time last Sunday.

Owing to the large number of British Army officers, civil servants and business people who use the K.L.M. service to and from India and other places along the Amsterdam-Batavia route, the acquisition of a new luxury fleet by this company will be of especial interest.

THE INDUSTRY

Altitude Record Equipment

AN additional note on the equipment of the Bristol 138 monoplane which gained the altitude record concerns the undercarriage. This, and the main skid unit, were manufactured by Aircraft Components, Ltd., of Cheltenham.

Presswork Specialists' Change-over

IT is announced that the well-known presswork business of Henry Caton and Co. (1936), Ltd., Britannia Works, Paynes Lane, Coventry, has been taken over by Rubery, Owen and Co., Ltd., of Darlaston, and will in future be known as their Coventry works. The services of Mr. Henry F. P. Caton are retained as works manager.

Alvis Progress

ALVIS, LTD., of Coventry, last week announced a new issue of 800,000 ordinary shares of 5s. each, to be offered at 9s. 3d. per share.

The new Alvis engine factory—where a British version of the Gnome-Rhône is to be manufactured—has been finished for some time, and the installation of plant is now practically complete.

The company also has recently entered into an agreement with another concern for the manufacture of mechanised vehicles for military and commercial purposes.

A B.A. Merger?

AT the first annual general meeting of the British Aircraft Manufacturing Company, held recently at Hanworth, the chairman (Lord Willoughby de Broke) foreshadowed a merger.

For some time past, he said, the directors had had under discussion a project with a view to the merging of the Company with other well-known companies. That merger would strengthen the position of the Company tremendously and should prove of great benefit to the shareholders not only of their Company, but of the other firms concerned. He preferred at this stage not to go into any further details, but shareholders would receive full particulars in due course.

Explaining future sales policy, Lord Willoughby de Broke said that the present model of the Swallow continued to find a very ready market, not only in this country, but in other parts of the globe. They claimed, and with good reason, that it was the safest aircraft in the world. A striking and significant feature was the number of flying clubs which were using the Swallow for instructional purposes, and the presence of those machines all over the country was bound to have a beneficial effect upon the sales.

In pursuance of their policy of progress, a new type of Swallow was being evolved, with modified wings and tail, but with exactly the same fuselage, which would be capable of performing full aerobatics. The new model should find a ready market as an advanced training machine or one which would suit the experienced pilot who wanted something a little faster and more dashing than the standard Swallow.

Speaking of the Eagles, Single and Double, Lord Willoughby de Broke said that the former was soon to be offered with either a fixed or retractable undercarriage at option, while the latter had come through its tests with flying colours and comparatively few teething troubles, so that they would be able to begin delivery early in the new year.

It had been necessary to double the capacity of the works in order to cope with the programme of civil aircraft production on the one hand and important sub-contract work from other aircraft companies on the other hand. In both these branches they would have as much work as they could handle as soon as the extended works were completed, which they expected would be by the end of the year.

NEW COMPANIES

THE ANTI-ATTRITION METAL COMPANY, LIMITED, was registered as a public company on October 2 with a nominal capital of £80,000 in 800,000 shares of 2s. each. The objects are to acquire the business of and undertaking of the Anti-Attrition Metal Company, Ltd. (incorporated in 1886) and to carry on the business of iron, brass, bronze, steel, copper and general metal founders, etc. The purchase consideration is £62,200, payable in cash. The directors are: Stephen Loosen, James Whitby, Charles Adams, Charles W. C. Hine and Alfred F. Hayes. Registered office: Glengall Works, Glengall Road, London, S.E.15.

HYPOWER, LTD.—Private company, registered October 5. Capital, £5,000 in 5,000 shares of £1 each. Objects: to carry on the business of manufacturers of machinery, makers of tools and other implements, manufacturers of aircraft of all kinds, wings, fuselages and all other parts of aircraft; electrical, mechanical and general engineers, etc. The directors are: Stanley L. Beale, Frank H. Jones, Geoffrey W. S. Beale, Brig.-Gen. Wm. W. Warner. Registered office: 46 Hatfield Street, London, S.E.1.

CHRISLEA AIRCRAFT COMPANY, LTD., was registered as a private company on October 2 with a nominal capital of £100 in 2,000 ordinary shares of 1s. each. The objects are to carry on the business of manufacturers of civil aircraft, etc. The subscribers are: Richard C. Christoforides, 12, Warrington Crescent, London, W.9; Geo. H. Olley, 19, Devereux Court, London, W.C.2. Richard C. Christoforides is first director.

SPEEDWELL SCHOOL OF MOTORING AND AVIATION, LTD.—Private company, registered October 2. Capital, £1,000 in 1,000 shares of £1. Objects: to carry on the business of giving instruction in automobile driving and flying of aeroplanes, and in their maintenance and repairing, and the understanding of aeronautics, etc. The permanent directors are: Cyril Levy, 33, Basing Hill, London, N.W.11; Dennis Levy, 33, Basing Hill, London, N.W.11.

INCREASES OF CAPITAL

BOULTON PAUL AIRCRAFT, LTD. (Pendeford Lane, Godsall, Wolverhampton).—The nominal capital has been increased by the addition of £200,000 beyond the registered capital of £300,000. The additional capital is divided into 800,000 ordinary shares of 5s.

SIMMONDS AEROCESSORIES, LTD. (18, Essex Street, Strand, London, W.C.2).—The nominal capital has been increased by the addition of £24,900 in £1 ordinary shares beyond the registered capital of £100.

AERONAUTICAL PATENT SPECIFICATIONS.

(The numbers in brackets are those under which the Specifications will be printed and abridged, etc.).

(Published October 15, 1936.)

878. ECLIPSE AVIATION CORPORATION: Interlocking device for the control of electrical systems (453,765).

1257. SCHMID, F.: Method of and means for warming the wings and other parts of aeroplanes (453,825).

3908. PESCARA, R. P.: Flying machines with rotary supporting surfaces (453,807).

19681. BENDIX, LTD., and HALL, R. E.: Brake Operating mechanism for aircraft (453,797).

16340. BRISTOL AEROPLANE CO., LTD., FEDDEN, A. H. R., and ANDERSON, G. O.: Supercharged internal combustion engines for aircraft (453,915).

17223. SACHSENBERG, G.: Aircraft hangars, factory buildings, and the like (453,942).

ELIMINATING EXHAUST NOISE

THE search for silence goes on, and among the latest developments in the concerted campaign against noise is a new type of Burgess silencer designated the Model F.K., which, for a back pressure reading of 0.3 lb./sq. in. (far below previous results) gives a noise reduction of 23 phons, sufficient it is claimed, to reduce engine exhaust noise below the level of airscrew noise.

Developed at the Royal Aircraft Establishment, Farnborough, the design of the new silencer is based on principles by which the noise reduction from a given design can be closely predicted. In all cases it has been found that the noise reduction, as measured by the Barkhausen audiometer, agrees with the calculated value within the limits of error of observation.

In the course of development for an aero engine of 500 h.p., the silencer passed tests for noise reduction and back pressure; an explosion test (in which the silencer was filled with a petrol-air mixture which was exploded by a hand magneto and sparking plug fitted in the entry pipe); a 50-hour bench endurance test and another of the same duration in the air; and general flight trials of the final installation, including noise tests. Incidentally, eighteen explosion tests caused no damage.

The same type of silencer was also subjected to the following trials: 20 hours bench testing on a 165 h.p. four-cylinder engine; bench tests on two single-cylinder units at powers ranging from 25 h.p. to 55 h.p. (about 300 hours in all); bench and flight tests on a 720 h.p. six-cylinder two-stroke compression-ignition engine (30 hr.); and a special test, where exceptional silence was required, with two silencers fitted in series giving a noise reduction of 52 decibels with a back pressure of 0.65 lb./sq. in. In the test with the big C.I. engine a 2[illegible] decibel noise reduction was measured from the ground with the machine at 2,000 ft.

When constructed of 20 s.w.g. mild steel and giving a noise reduction of 20 to 25 db. with a back pressure of 0.3 to 0.[illegible] lb./sq. in., the silencer weighs 0.14 to 0.15 lb./h.p. Nothing less than 20 s.w.g. has been tested, but it is thought that a reduction to, say, 22 s.w.g. would have no adverse effect, except possibly, in the very severe explosion test.

It is claimed that, as the silencer is of a "reflection" type with low back pressure, it is possible with a properly arranged exhaust system to obtain more power silenced than with open exhaust ports. This is due to the fact that resonance in the pipe between engine and silencer tends to cause suction on the exhaust stroke. The makers are Burgess Products Co., Ltd., Barwell, Leicester.